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FUTURE

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LIFE #25
MARCH 1981

SATURN

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On the Scene with
Harlan Ellison

Getting Ready for
Voyager 2

Saturn Art
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**SPECIAL
THIRD
ANNIVERSARY
ISSUE**

EPCOT: Disney's Greatest Dream

'Altered States'

Stepping Into an Isolation Tank

**The Graying Earth:
Halting the Aging Process**

Interview: Roger Zelazny

Art by Steve Dodd and Jim Bryant

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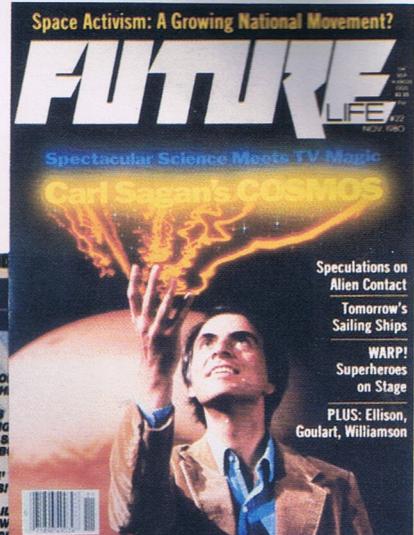
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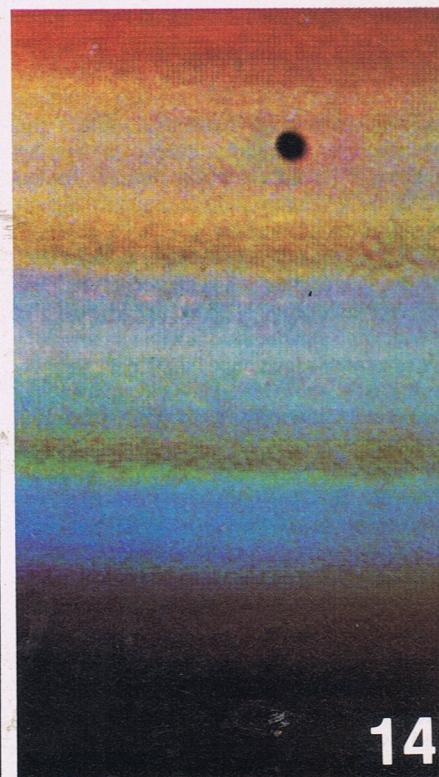
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FUTURE LIFE is science fiction authors and book reviews, incredible art portfolios, music and media trends. It's interviews and articles by the greatest minds of our planet (including Harlan Ellison's regular column) with words of warning about our present and words of inspiration about the wonders of tomorrow. In other words, it pleases your eyes and teases your imagination.

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ON THE COVER: The miracle of Saturn's rings, as photographed by Voyager 1. For a first-hand account of the scene at JPL during the Saturn fly-by of last November, read Harlan Ellison's article on page 14.

Special Anniversary Editorial

Reaching for the Stars

The single most alluring subject to readers of this magazine is *space*.

That allure is generated partly because we, the staff, have been smitten by the space bug and partly because the lure of the heavens communicates to every human on our planet—no matter what their country's policy toward space—no matter their language and age.

Bradbury's Complaint...

Recently, author Ray Bradbury said, "Here are all the kids of the world going off to science fiction movies. Why? They want to be in touch with the universe, and the kids are hungry for that kind of idea. The politicians should be smart enough to tap into that and take that energy and use it to build and grow out into space..."

But Bradbury fears our nation is headed for spiritual ruin unless "dumb politicians" who hold the pursestrings get out of the way and let Americans reach for the stars again.

"We haven't had any leadership from any of our government officials for a good many years," Bradbury said. "I just wish we could get someone with a sense of the future, with the ability to dedicate us to something we could all care about. Something that's different from war...and I think *space* is the answer!"

The Great Depression...

One of our Canadian readers, Sheldon Young, wrote, "...since the Apollo landing of 1969 when the people of the United States felt such a tremendous feeling of pride and accomplishment in having put a man on the moon, there has followed a decade of psychological depression. 1969 was a time when people everywhere gazed up into the night skies in wonder and awe at the true magnitude and beauty of the universe. But we have come crashing back to Earth like Icarus, back to harsh and oftentimes disheartening realities of our lives. In this time of recessions, shortages and so on, we need to be uplifted psychologically and spiritually. For the sake of the creative soul of Man...let's go to Mars!"

The Afterglow...

Indeed, there was something almost magical about the brief days of Apollo 11, not just for the U.S. but for all humanity.

Author/philosopher Ayn Rand described it best: "The next four days (following the

landing) were a period torn out of the world's usual context, like a breathing spell with a sweep of clean air piercing mankind's lethargic suffocation. For 30 years or longer, the newspapers had featured nothing but disasters, catastrophes, betrayals, the shrinking stature of men, the sordid mess of a collapsing civilization... Now, for once, the newspapers were announcing a human achievement, were reporting on a human triumph, were reminding us that man still exists and functions as man.

"Those four days conveyed the sense that we were watching a magnificent work of art—a play dramatizing a single theme: the efficacy of man's mind."

Our Desperate Need...

It would seem that what we need today, desperately, is another great event—a triumphant accomplishment in space that speaks to all the peoples of our planet. It would seem that, as Bradbury put it, "space is the answer."

I wish it were. It would be easier to land a man on Mars than to do what *really* needs to be done. We do *not* need another great event "torn out of the world's usual context," an event that creates no *permanent* change—only the temporary illusion that all is well.

All is *not* well. Our world is painfully ill, and we need more than momentary relief of the symptoms; we need a cure! But in order to change the headlines in the news, we must first change the society in which the news is made.

We need a revolution.

Battle Cry...

I see the revolution in terms of a fight for *freedom*, and my battle cry is *set the slaves free!* By "slaves" I mean every individual who is, in any way, restricted in his freedom and who has any portion of his property and earnings taken from him by force. In other words—everyone!

We require freedom in two ways:

Physically...

Physically, slavery exists in a political form. Originally, the government of this country was established to protect individual rights—not to build roads, handle education, provide food and housing and get involved in a million other activities that are properly the realm of personal responsibility and private business.

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Slowly, over the years, the growing interference of our own government in business and individual lives has created an almost-invisible stranglehold that has had a more horrible effect on the growth of our country than any *enemy power* could hope for.

We must demand that government de-control, de-tax and de-regulate everyone. The government must get out of our private lives and out of all business and economic matters—without exceptions! The role of the government is not to provide nor to restrict.

And, yes, that means the government should get out of space too—with the exception of doing what is necessary in space to provide military protection for the people of this country. But the government should leave communications, astronomy, shuttle service, non-military research and all other forms of industrial development in space to industry.

And Mentally...

Mentally, our slavery is self-imposed. The human race has never fully learned and appreciated the power of the human mind. We have never believed that all the mysteries of reality are knowable. We have never understood that we can fully conquer nature and that nature has nothing to lose when we do it properly. We need to discard all the old mystical superstitions and beliefs that hold us back and undercut our self confidence.

It is embarrassing that, as we approach the 21st century, vast numbers of humans still believe in ghosts and gods, in astrology and UFO's, in secret Communist compounds that beam sterilizing radiation from somewhere in New Jersey via the Empire State Building—and all the other primitive balderdash that civilized minds ought to have discarded as we emerged from the Dark Ages. (Harlan Ellison formed an excellent catalog of irrational nonsense in last issue's column.)

And lest I be misunderstood—I consider all the modern, sophisticated religious movements to be just as primitive and mentally enslaving as the “radiation” theory. *All of them*. And if your immediate emotional reaction is to rush to the defense of *your* particular religion—to tell me all the wonderful ways in which Christianity or Judaism or Catholicism or Zen Buddhism or any other “ism” has benefitted human life on Earth—then I tell you bluntly that precisely that attitude of vested interest in faith, as opposed to reason, is one of the intellectual weights that keeps us earthbound.

The Revolution...

Set the slaves free, and you will see research and exploration explode. With no taxes and regulations and with new intellectual self-confidence, business will invest vast sums of money into long-term projects, with huge profits as their goal. Scientists and inventors will find fresh blood surging through their laboratories, stimulating new excitement. Ideas will blossom. And one of the most costly explorations—space—will move within the realm of possibility for *private* companies, for the first time.

Set the slaves free, and you will see the formation of *new* corporations for space exploration—perhaps managed by ex-NASA



“Reaching for the Stars” was originally conceived by Kerry O’Quinn and Boris Vallejo and magnificently painted by Boris for the cover of FUTURE#3. It dramatizes, in a single image, the spirit of this magazine and has become its artistic symbol. Posters are available for purchase(pg.8).

people—funded by public stock sale—with goals and projects as varied as practical imagination can conjure. You will be able to become a direct contributor to whatever space goals you want to support, and, even better, you can *profit* from the results of the space corporations you own stock in. It will be like the opening of the West with entrepreneur mavericks of all sorts—some with sensible, conservative plans, some with wild schemes and mad dreams—a gold rush to the stars!

Raising a Banner...

Just as it happened with the Industrial Revolution, the incredible forward movement of *our country* will affect the *rest of the world*. Not even the most backward, enslaved countries will be able to ignore what they see in the United States, and the results will be awesome. Just look at what the coming of free enterprise in Japan alone has given the world within the past 20 years. Think what it would mean to the progress of humanity if the creative and productive potentials of every individual in every country in the world were set free to do his/her best—to pursue his/her goals—to earn as much as he/she can—to rise as high as he/she is able.

Nobody can begin to predict *all* the wonders that would result, but I can say one thing with *certainty*: The movement into space would absolutely, without question, be one of the major consequences of a freedom revolution.

Philosophy...

But *space* is not the answer. No, the answer, as always, lies in the realm of philosophy—that distant, Ivory Tower world that most people still think of as a college elective having no relationship to everyday life—no relationship to the murders and monstrosities

of the daily headlines—no relationship to inflation and unemployment—no relationship to a world splintered in warring factions and barbaric conflicts.

Philosophy—if you really think it has no relationship to our getting to Mars, think again. Actions are the results of ideas—of thinking or not thinking. The ideas of our culture form the actions of our culture. If we rebuild our thinking—activating the positive ideas we need, discarding the negative ideas that harm us—*Mars will move much closer to Earth*.

Who Will Lead...

And who, pray, will start this revolution? We have no mighty George Washington, no idealistic Thomas Jefferson, no uncompromising John Adams—no visionary leaders to stand boldly before the people and urge them toward the personal responsibilities that pure freedom will require. Who?

We. We, the futurists—the readers of this magazine—the scientists, the artists, the young students, the creative businesspersons, the intellectuals, the dreamers, the idealists—we must lead the revolution.

Ayn Rand once said, “Anyone who fights for the future, lives in it.”

On this special occasion, the Third Anniversary Issue of FUTURE LIFE, I wish to toast all those who join us at this most exciting time in human existence, all those who, through this magazine and in various personal ways, are fighting for a better tomorrow. And I wish to re-dedicate FUTURE LIFE to the revolution ahead, the revolution that can launch the human race *permanently* into space.

Anyone who reaches for the stars, lives among them.

Kerry O’Quinn/Publisher

Because of the large volume of mail we receive, personal replies are impossible. Comments, questions and suggestions are appreciated, however, and those of general interest may be selected for publication in future issues. Write:

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GROWING UP

... I would like to thank Trudy Bell for her thoroughly engrossing article on the dollars and cents of the space program—"Space: Is It Worth It?" (FUTURE LIFE #23). The article finally gives me the black and white statistics to answer the constantly occurring questions about the advantages of putting man back into space and on the Moon that I invariably get asked whenever I get involved in a discussion/debate on the space program with some of my more conservative acquaintances. I would, however, like to add one thought of my own that I have always felt appropriate for this type of debate. The Earth is the birthplace of mankind, and has, in a sense, been its cradle. Now he is beginning to take his first tentative steps away from his cradle. To those of us who would like us to remain on Earth and solve our problems first and foremost before going into space, I would like to point that that no one, especially man, was meant to live in a cradle forever.

Danny Bates
Dallas, TX

SPACE SOCIETY

... I would like to take this opportunity to inform your readers of a relatively new "pro-space" organization that did not appear on the list in FUTURE LIFE #22. The Independent Space Research Group (ISRG) was formed to carry out privately financed scientific space projects at low cost through the use of volunteer labor, commercially available equipment and proven systems. AMSAT, the organization that builds amateur radio satellites, has used these methods for years to build amateur radio communications satellites for (by their own estimation) about 1/40th of what it would cost NASA or a large corporation to build identical devices. The ISRG simply believes that, with today's technology, the same methods can be applied to practically any type of small, unmanned spacecraft.

The ISRG should be of particular interest to amateur astronomers, since our major project at this time is the construction of a small astronomical satellite, carrying an 18-inch diameter telescope, that can be used by students, educational institutions, and amateur astronomers around the world. Our organization actually grew out of this effort, which was started in early 1979. We are cur-

rently negotiating with NASA and the ESA for a launch in late 1984. In addition to the astronomical satellite, we are designing a Test Satellite for launch in 1982, and are cooperating with a group at the University of Utah engineering department who are building a small solar sail for ejection from a "Get Away Special" cannister on a shuttle flight.

Those wanting more information should send a self-addressed, stamped envelope to ISRG, c/o John Ginder, 7 Sunset Terrace, Troy, NY 12180. USA.

Jesse Eichenlaub
President ISRG
Troy, NY

PROBLEMATICAL SOLUTIONS

... The article by Trudy Bell in FUTURE LIFE #23, complemented by Norman Spinrad's remarks earlier in that issue, summarized perfectly my own sentiments over the last dozen years or so.

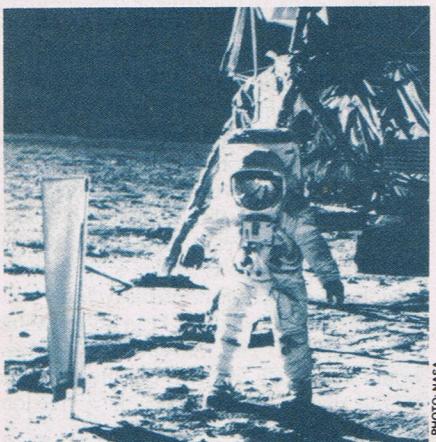
The United States is teeming with malformed, slogan-slinging decerebrates whose greatest sensitivity is to abdominal stimuli. Whatever hits them hardest in the gut is what they'll respond to, vis-a-vis Trudy Bell's "... spindly living skeletons in Biafra, the mangled corpses of gangly teenaged boys slaughtered in an undeclared war . . ."

This kind of gut-level reaction has little to do with compassion. It's an immediate unthinking response that is based on a lifetime of pseudo-moralistic programming and religious guilt ethics.

Those who really believe we can, and must, solve humankind's "problems" before going into space had better consider again the very source of those shortcomings. The only cultures without any "problems" are dead ones.

Richard J. Grasso, Jr.
Omaha, NE

LETTERS, PLEASE



its present anemic rate. In recent years the entire NASA budget has been well below one percent of the federal budget. The funds spent on planetary exploration have been less than 15 percent of that. As a result, many important missions have been abandoned.

Public support for new missions has been minimal, probably due to the widespread belief that the Space Program is an esoteric novelty appealing only to scientists. But the benefits of planetary exploration are, in fact, very tangible to us here on Earth. Planetary exploration provides advancements in the sciences and technologies we are so reliant upon here on Earth. It provides cautionary tales of alternative fates for our world. It is an outlet for the human need of expansion and discovery, a provision for our species' passion to learn. And it represents the first toddling step in our future colonization of space.

Presently, we remain isolated from the rest of the solar system, confined only by gravity and mundane politics. However, there are many projects on the horizon, both technologically and financially feasible, that would be sound future investments. Some of them include: Solar sailing ships with sails a mile across that would catch the gusts of the solar wind and set a course for rendezvous with icy comets; Mars rovers that would be unimpeded by conventional landing struts, free to wander on wheels to the more interesting parts of the red planet; probes that might land on Saturn's largest moon, Titan, which has an atmosphere that may contain organic chemicals—the building blocks of life; solar probes that would plunge into the depths of the sun transmitting back valuable data before being vaporized; and, possibly, manned missions such as a Space Shuttle rendezvous with a nearby carbonaceous asteroid.

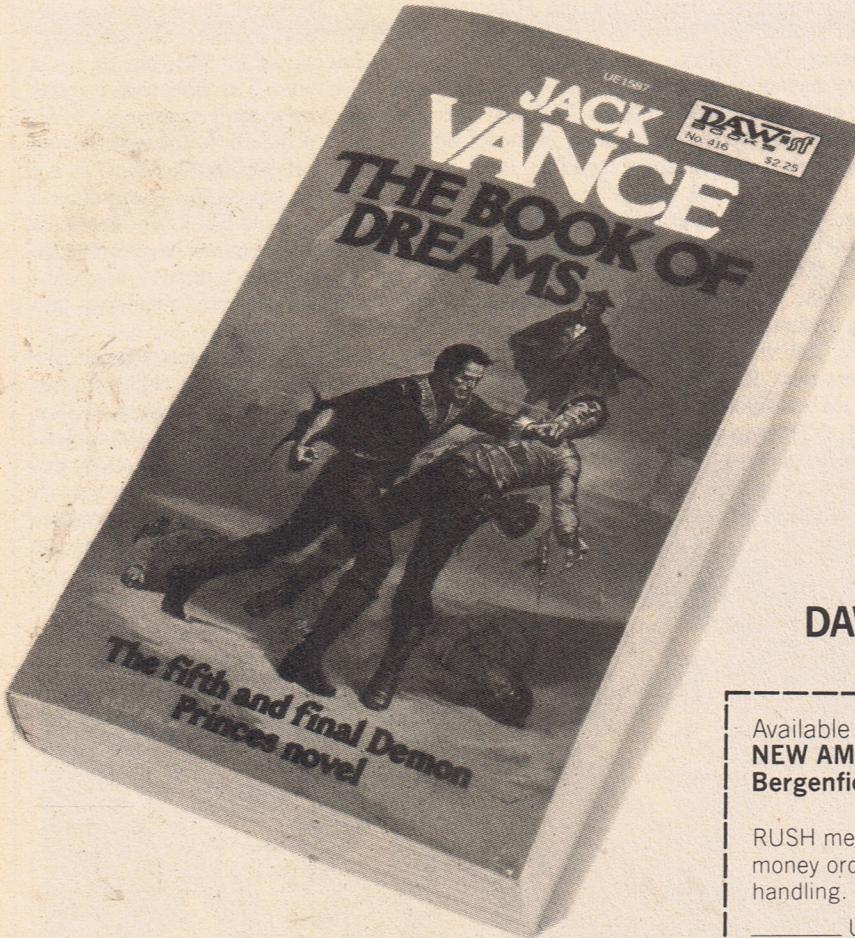
Although well within the reach of our present technology, these projects continue to gather dust in NASA file cabinets. However, recently approved was Project Galileo, a proposed middle-1980s mission to perform the first orbital reconnaissance of Jupiter and to drop the first probe into its atmosphere (Jupiter's atmosphere may contain organic chemicals synthesized in a manner similar to the chemical events which on Earth led to the origin of life). But soon after its approval, Congress so reduced the funds available for Project Galileo that it is, as of now, "teetering on the brink of disaster."

Requests by planetary scientists for new missions have been repeatedly rejected. As one senator explained, "The public has not, despite *Star Wars* and *Star Trek*, written to Congress in support of planetary missions, and scientists do not constitute a powerful lobby." However, it is my opinion that there are vast numbers of people deeply concerned with the future who are unrecognized by the government (the widespread popularity of future-oriented magazines proves this). Therefore, I urge anyone concerned about the future of planetary exploration to write a

... Through the efforts of the unmanned space program over the past two decades, we have seen, tasted and touched the planets through the senses of tiny spacecraft. But, sadly, our senses will once again be entirely Earth-bound if federal funding continues at

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DAW PAPERBACKS

letter to his/her congressman, supporting new planetary missions. If each reader of FUTURE LIFE were to write such a letter, the government would be forced to acknowledge the existence of a large group of planetary exploration advocates. A widespread letter campaign would certainly provide the first step necessary to bring about an improved public and governmental awareness of the importance of the Space Program.

John Whalen
Rancho Cordova, CA

CASHING IN

...After reading a number of Carolyn Henson's articles, I really don't think that she needs or requires any defending. She sounds quite capable of doing that herself. But after reading the Input section of FUTURE LIFE #23, the L5 Society gets a check for 20 inflated bucks that I really can't afford. The rest of the Space Coalition will also get at least a small token of monetary faith as the cash comes on line. This is with the realization that, though in some way I might derive some benefit from the spin-offs, it isn't likely that I will be able to participate in the space effort. And that's where the satisfaction's at—getting there. The fact that I will only be able to enjoy space exploration vicariously doesn't dim the faith or belief in its final culmination. I have more faith in man than in all the deities, major and minor, that he can call on.

William MacDonald
Ocala, FL

FUTURE DREAMS

...I wish to praise you highly for your magazine FUTURE LIFE. I subscribe to it regularly, and kind of get high on it, because it makes me dream I'm actually in the future, emancipated from the fetters of this Earth. I once had a vivid dream that the end of the world had come, and I found myself in this huge construction, in a balcony, looking out into space. The whole "building" was really high up, away from Earth. In my view were two or three planets suspended, plus others in the far distance. I got the feeling that this was like a vestibule to heaven, of sorts, and that this place had some administrative function for the surrounding reaches of space. I got the impression that peoples' lives on Earth are like training grounds for future responsibilities on a far vaster scale. Perhaps this is true, and that God wishes to make man capable of using such powers wisely. He certainly doesn't down here.

David C. Strickland
South Yorkshire, England

WRITING RON

...In these next few weeks, President-elect Reagan will be formulating policies that may very well change the course of American

government. This is the optimum time for those of us who favor a strong U.S. space effort to make ourselves heard.

These next four years are crucial. If America doesn't get off her backside and revitalize the Space Program, the year 2000 could be a lot worse than the doomsayers predict. Increased Soviet Space expenditures should have warned our representatives in Washington a long time ago. Western Europe's ambitious designs for the High Frontier should have served as an omen to our leaders. They didn't.

Many members of Congress are still ignorant of the importance of space. This is a pity, since it has become increasingly evident that whoever controls space controls the world.

I urge you and all your readers to write to our new President and tell him where you stand on this important issue. If every man, woman and young adult who spent hours waiting on line to see the latest SF films were to take just a few minutes to write to President-elect Reagan, the future would look a lot better for all of us.

G.M. O'Brien
Brooklyn, NY

ESTIMATING ELLISON

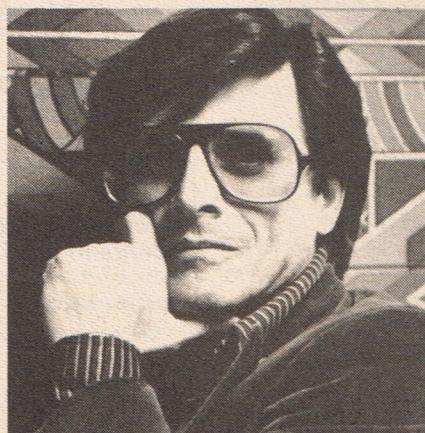


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...If men like Lester Del Rey were like Harlan Ellison, there wouldn't be a Harlan Ellison. If there were no Lovecraft, Bradbury and Bloch might be plumbers. For all anyone knows, there might have been a playwright in London who gave support to a couple of theater fans who became William Shakespeare and Francis Bacon. And so I think that Ellison's broadsides at fandom were mean-minded and stupid.

Obviously, there is no excuse for an adult, or an informed child, to write an author to request money or help find an agent, nor should anyone send weird pictures (unless they're good as well as weird) nor do many of the other things listed. However, readers have been sending writers fan mail and manuscripts as long as there have been writers and readers. While no author ought to have to look at the manuscripts, I think Ellison should remember that a great many good

writers were once pimply faced fans who sent enormous letters of idolatry to their favorite writers (or science fiction/literary magazines/fanzines/etc.).

I'm sure Ellison won't stop being cruel and dogmatic, but I think that someone should try to take him on, on grounds other than political beliefs. (I agree with most of his views, incidentally.) For a writer, he's strangely non-empathetic, or perhaps it's just that in our fractured times creative personalities are becoming bitter and solipsistic. (Read recent works by Heinlein or see a Woody Allen movie.) In either case, it seems as if anyone who doesn't measure up to his beliefs and his standards is automatically an escapee from a chipmunk factory. (I'm not the only one who thinks this. According to Variety, a guy is suing Ellison for libel.) He seems to realize that others have problems, but only on an intellectual level. He seems unable to convert his understanding into compassion.

In my opinion, Ellison succeeds because he has an enormous amount of ability that no lack of style can overshadow. His major flaw as a writer is that he uses the verbal complexity of a Borges like a baby firing an AK47: lots of pyrotechnics, not much (at least, not much of the right) results. Science fiction readers look behind the murky prose and see the jewel and award a Hugo.

Allison Bell
Kansas City, MO

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FILM

ATTACK OF THE LAUGHING WARTHOGS

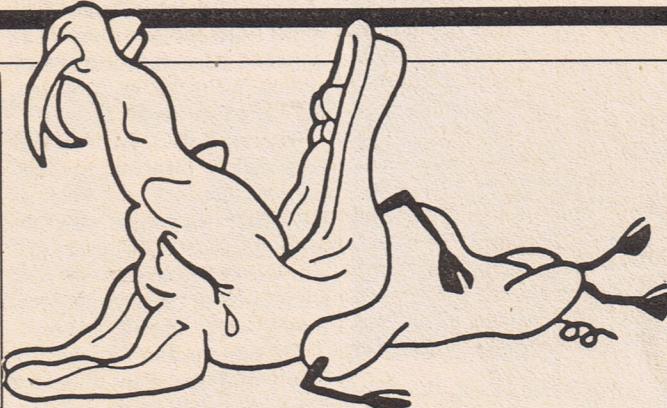
Enumclaw, Washington, is famous for its pickle factory, the first Weyerhaeuser lumber plant and its remarkable sidewalks, which roll up at sunset. Not exactly the kind of place you'd expect to find a motion-picture studio with nine 35mm Mitchell cameras, an animation stand, a computer-controlled tracking camera, an optical printer and a state-of-the-art recording studio superior to most of those in Hollywood!

Then again, you wouldn't expect said company to be named Euro-Asian Laughing Warthog Productions... would you?

"We wanted either a name nobody could forget—or else pronounce," says Barbara Vetter, 28, partner with 24-year-old Sam Longoria in this inspired madness. "With a name like that, it took a little while for people to take us seriously. Now that we're established, and have business accounts with places like Alpha Cine Laboratories, where Industrial Light and Magic sends their effects film to be developed, people aren't laughing any more—at least not at our name."

Vetter and Longoria earnestly hope people will be laughing at Warthog Productions' first venture—a feature-length, 35mm, color, all talking, singing and dancing extravaganza titled *Search for the Gods?*, due to be unleashed upon the unsuspecting film world sometime in the coming year.

Asked to describe the movie, Longoria says: "Without risking a lawsuit, *Search for the Gods?* is a parody of certain highly publicized pseudo-scientific ancient as-



PHOTOS © 1981 BARBARA VETTER

Sam Longoria sits at the Warthogs' 16-track mixing console.

tronaut theories, and a certain genre of sleazy pseudo-documentaries which offer little in the way of real entertainment, and blow town quickly after massive ad campaigns." In other words, they're perpetrating a bigger and funnier fraud than *Chariots of the Gods?*

Work on this all-consuming project began five years ago, when Longoria and Vetter were at the University of Washington. "We met in a revolving door," Sam quips, "and started going around together." Vetter had just made a documentary film, *A Longitudinal View of Schizophrenia*, which garnered prizes

from the Portland, Bellevue and Hiroshima film festivals. They found a certain synergism working together, and decided to co-produce Sam's idea for a film ridiculing ancient astronaut theories. Along the way they fell in love, got professional and lost all their original volunteer crew. They blame the defections on their grueling schedule and lack of wages.

"If you think about the whole film, you can get very depressed," says Barbara. "You have to take it day by day, shot by shot. This first movie cost us \$350,000, but that includes all our equipment. The next several

should cost only about \$50,000 each."

Among their dedicated workers are matte artist Ko Hashiguchi, and Sam's brother David, who scored the soundtrack. The music, performed by a 50-piece orchestra and a 40-piece Big Band, was recorded in the Warthog 16-track studio, and a Seattle church. The movie is the first film made to utilize the radically new Kintek sound system, developed by Hollywood sound technician John Mosely. When played on specially modified projectors, the optical track yields four-channel stereo with DBX noise reduction. Remarkably, it's also compatible with regular projectors.

"Film is our only vice," says Sam. "We live, eat, breathe, drink and smoke it—though it's kind of hard on the lungs at times. We started to make *Search* in 16mm, but discovered that, when you include the price of a blow-up, it's no more expensive to shoot a dramatic feature in 35mm—and the effects are much better." To research top-quality visuals, the couple visited the studios of friends (several of Hollywood's leading effects men). One of the results of this research is Sam's \$1500 motion-control camera, controlled by a Radio Shack computer and capable of swooping and diving with the best of them.

Their funding has come entirely from short-term personal loans from friends and relatives. "If *Search* doesn't make it," Barbara says, "there is nowhere in this hemisphere we can live." To eliminate distribution rip-offs, the couple has also formed their own distribution company, Fly-By-Night.

Hollywood, be forewarned: the Warthogs are coming!

—Malcolm Brenner

JUPITER PROBE

SPACEY REALITY



ART: © 1981 ADOLF SCHALLER

In FUTURE LIFE #9, we reported that a painting by space artist Adolf Schaller had won an award from the Society of Illustrators. Now, Schaller's piece, *Jupiter Probe*, may be a vision come true. NASA recently announced the flight test of the parachute system for the Galileo Jupiter atmosphere probe. This will actually be the third and last test of the probe parachute system. The experiment is being conducted at NASA's Naval Weapons Center Test Range in China Lake, Calif. Once the test

program is completed, the parachute system will be ready for delivery to the probe.

The parachute system will slow the descent of the probe in Jupiter's turbulent atmosphere for an hour while it makes the first measurements of the now-mysterious gas clouds expected to be made up of ammonia, ammonia hydro-sulfide and water cloud layers. The Galileo Probe will be mounted to a Carrier Spacecraft and is scheduled for a March 1984 launch. It is expected to encounter Jupiter in September 1987.

TRACKING SATELLITES

UPDATE: NIMBUS 6

When we last left Nimbus 6 in FUTURE #5 ("Snow Trek," page 12), the NASA meteorological satellite had been hot on the trail of Japanese explorer Naomi Urmura and his dog sledge as they traveled across 500 miles of the polar ice cap. NASA had developed a battery-powered beacon and fitted it to the sledge. Every 108 minutes, a radio signal was transmitted to Nimbus 6.

Well, Nimbus has a new assignment, this time to follow the exploits of Peter Bird, who left Baja California on Nov. 11, bound for Brisband, Australia, in a...rowboat. A 33-year-old photographer from London, Bird expects the journey to take between nine and 12 months.

The British mariner is rowing

the *Britannia II*, a 35-foot craft designed by Uffa Fox for Royal Navy rescue missions. The same vessel carried Bird and a companion across the Atlantic in 1974, but now he wants to go it alone.

As for the satellite, it too has been busy over the past two years. It tracked a two-man balloon flight across the Atlantic and an Egyptian desert expedition. *Britannia* is carrying the same type of transmitter used for all of these, and the beacon data will again be radioed to NASA's Goddard Space Flight Center in Maryland. Bird expects to communicate, via radio, with a shore station in San Francisco, and will use the Nimbus location data to correct his own position computations.

Britannia's Nimbus transmitter sends a burst each minute which identifies the position of the vessel. Meanwhile, Bird's

LOOKING UP

LAND OF THE GIANTS

If you've got an extra million dollars rattling around in your pocket with no place to put it, consider the astronomical investment being offered by the Universities of California, Arizona and Texas. Oh, not the kind of investment that reaps financial rewards (after all, this is an era of supposed transcendent considerations). We're talking telescopes. Big telescopes. Really BIG.

How big is BIG? All three universities are planning to build 'scopes that will out-Palomar Palomar, in two cases with mirrors over twice the diameter. So if you've ever had a yen to see your name over an observatory door, now's your...uh, big chance.

The projects start with the University of Texas' plans to build a \$25-million, 300-inch reflector from a single piece of glass which, according to Dr. Thomas Barnes III, assistant director of UT's McDonald Observatory, is about as large as any of the major glass manufacturers is willing to produce. Scheduled for completion around 1986, it will have twice the light-gathering capability of Palomar.

The University of California

plans to go the next step larger, but concedes that the Texas project may be the largest monolith that will ever be produced. Therefore, UC scientists plan on "breaking up" the mirror into 36 smaller pieces or segments that will act as a single mirror when put together. The entire \$30-million project will be 400 inches in diameter and is scheduled for completion within a year of the Texas project.

Moving forward from their success with the Multi-Mirror Telescope (see FUTURE LIFE #14, page 16), University of Arizona astronomers are seeking \$40-50 million for a giant version that will employ eight 200-inch mirrors on a single mount, creating the same usable mirror area as a monolith 550 inches across. Scheduled completion date is more toward the end of the decade.

With astronomers already pushing their observations near the edge of the observable universe, many of them feel that these instruments may enable us to see back almost to the very moment of the beginning in time.

—Philip L. Harrison

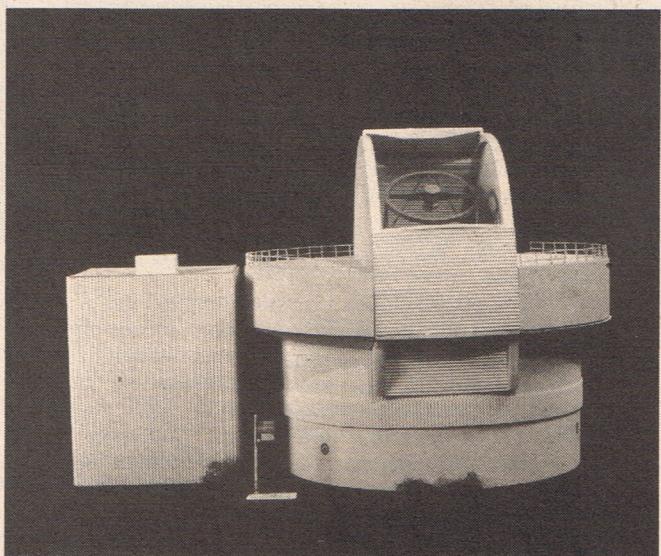


PHOTO COURTESY MCDONALD OBSERVATORY

A scale model of the proposed Texas observatory.

data goes up to Nimbus, down to a ground station in Alaska and then on to Goddard, where it is computer processed and mailed to the San Francisco station.

We wish Bird luck, especially

considering his first attempt at such a trek. On October 1 he left San Francisco, but the rowboat's hatches were not square and it capsized in rough seas.

—Bob Woods

SOLAR POWER

ENERGIZING ISRAEL

While solar energy still seems to be a rather unpopular project for development among the U.S. powers-that-be, there is one country located right in the center of the oilbelt that is promoting solar as its major source of electricity.

The mid-Eastern nation of Israel recently brought into force a

new set of regulations governing the use of solar energy in water heating. These regulations are part of a law which stipulates that, by mid-1980, "no building containing a unit or installation for the supply of hot water shall be erected unless that unit is a solar unit." According to the Israeli Consulate General, almost one third of all Israelis now heat their water with solar energy, saving the country an estimated 100,000

barrels of fuel each year.

Because of this large reliance on solar energy as a power source, a great deal of research and development is being focused on new ways to utilize the sun's rays; including a solar air-conditioning system, a solar cell with an internal storage system so that it can still generate power during off-peak hours and a solar-powered automobile. However, their biggest project is a large (possibly the

world's largest) solar electric power station which was inaugurated last year at the Dead Sea. Israeli officials hope that this facility, nicknamed the "solar pond," will be able to produce most of the nation's electricity in the near future; and possibly, with improved technology, become competitive with oil as a major international energy source.

—Barbara Krasnoff



Prof. Ayre Braunstein polishes the first solar-powered car.



Solar water heater, now common to Israeli roof tops.

PHOTOS COURTESY ISRAELI CONSULATE GENERAL

FUTURE FORESTS

SUPERTREES ARE COMING

And now...the better tree. That's what is being developed by researchers looking for ways to deal with deforestation. But these trees are not your normal roots, trunk and leaves variety. They can range in size from 65 to 15 feet, grow as much as 50 feet in a single year (which means they can grow back in two years instead of 10), prevent erosion, stop the spread of forest fires and provide raw material for the manufacture of fuel, paper and even food.

The supertrees are actually in the class of legumes (lima beans, lentils, chick peas, etc.), plants which enrich the soil through nitrogen-fixing bacteria in their roots. With strange names like Gmelina and Leucaena, these trees have been around for years, but are only recently being developed for their unique properties. The most promising so far is the Leucaena, which grows in Latin America and Southeast Asia, and has more than 100 varieties. Vegetables grown alongside Leucaena thrive, and the trees' foli-

age is an excellent source of edible protein.

As foresters continue to battle the awesome effects of deforestation, which devastates an area the size of Rhode Island every year, the cultivation of supertrees is especially attractive. They grow rapidly under arid conditions; one variety can be used as a diesel

fuel; another retards fire with its low, dense foliage.

And then there is the case of billionaire Daniel K. Ludwig and his monumental Jari project in the jungles of the Amazon. For the past 13 years, Jari has been growing a thriving crop of Gmelina trees on a 250,000-acre plantation. They are successfully

converted into fuel and paper pulp. Referring to the dimensions of the project, Ludwig once said: "I always wanted to plant trees like rows of corn." Plant on, sir.

The supertrees may not be the end-all to the devastation of the world's forests, but at least they provide a means of fighting back.

—Bob Woods



Billionaire Daniel Ludwig's "manufactured" forest—a 250,000-acre plantation of Bamelina trees.

PHOTO PBS

VIDEO

3-D TV TODAY

Owners of VHS and Betamax videocassette machines are among the first home viewers to be able to enjoy 3-D TV. MCA Videocassette has released *The Creature From the Black Lagoon* and *It Came From Outer Space* in 3-D. These two famous '50s features have been specially transferred to tape with the home TV screen in mind. Specially prepared glasses were designed to match the color phosphors of color TV picture tubes.

It has been rumored that more titles are forthcoming in 3-D, if this first brave step proves successful. Someone has even suggested home videotapes of live rock concerts in 3-D!

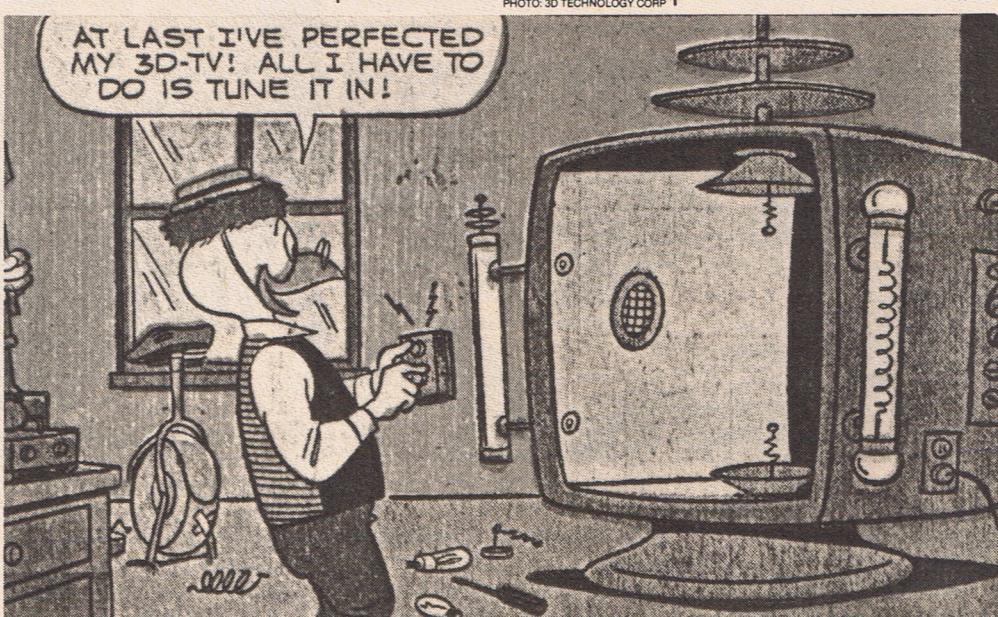
FUTURE LIFE #19 reported that James F. Butterfield, a world-famous stereoscopic and television expert, was to head up a delegation in Geneva to explore the possibilities for establishing standards for 3-D TV commercial broadcasting. The international committee met in October and approved Draft Report 312-3 titled "Constitution of a System of Stereoscopic Television."

This report was prepared after extensive examination by the member nations of various proposals for 3-D TV. The report recommends that a practical 3-D TV system provide: true three-dimensional viewing without viewer discomfort; group viewing from any location in the television room; compatible 3-D television receivers which do not ob-



solete present 2-D receivers; a quality picture with colorimetry and resolution comparable to conventional television pictures; minimal modification of governmental and industry standards; and moderate prices in converting studio and station equipment and in the cost of the 3-D TV receiver.

—David Hutchison



Above: Disney's version of 3-D television. Top: James F. Butterfield, stereoscopic expert.

FUNNY FONE

TV TALK



You're in the middle of your favorite TV show when an alarm sounds from the set and a flashing light is activated. Your first thought may be to run to your nearest shelter zone with canned goods, but if you're hip to the Space Phone, you press a button on your Space Command

3500 remote control transmitter, sit back in your easy chair and take the phone call.

The first step toward making the television the center of a home communication system has now been taken by Zenith, which has introduced a new series of color TV sets that allows a viewer to answer incoming phone calls via a TV set when it is connected to an ordinary telephone jack. The caller's voice is heard through the TV and a voice-activated microphone inside the set picks up voices anywhere in the room, so quiet aside are out of the question. However, the Space Phone is equipped with a privacy button that puts the caller on hold. Outgoing calls can be made using Space Phone after the connection is made on a regular telephone.

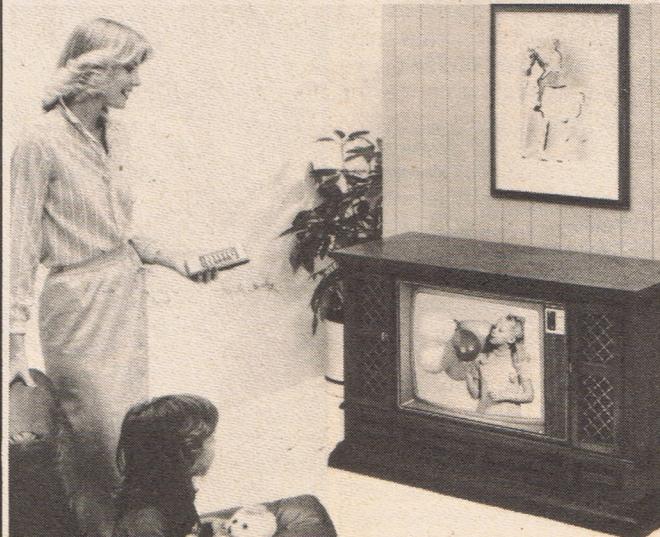
"Family members no longer will be tied to extension telephones in different parts of the house during a group call," says Walter C. Fisher, president of Zenith Sales Company Division. "For the first time they will be

able to join in a phone conversation from the same room."

Space Phone, which will be available in August, is being introduced initially as a feature of a series of new remote control microprocessor-tuned color TV sets. The 19-inch model will sell

for around \$750 and the four 25-inch consoles will sell for between \$1,200 and \$1,500. Not too bad when you consider the joy it will bring Aunt Ethel—who'll hear Happy Birthday in three parts next time you call her.

—Susan Adamo



How do you take this telephone off the hook?

HUMAN RIGHTS

SF WRITER IMPRISONED

It is a sad fact of life that, in many countries today, people are being imprisoned for the "crime" of espousing ideas and opinions which may not be agreeable to their government. One of those now being held in the U.S.S.R. is a science fiction writer named Oles Berknyk.

Berknyk is well-known among his contemporaries, and among the youth of the Ukraine, both for his more than 30 science fiction works, and for his espousal of Ukrainian nationalism (the Ukraine is one of the U.S.S.R.'s 15 autonomous republics). According to Amnesty International, the worldwide human rights organization which is monitoring his case, Berknyk's work was characterized by "a preoccupation with philosophical and moral questions and a distinct tendency towards mysticism."

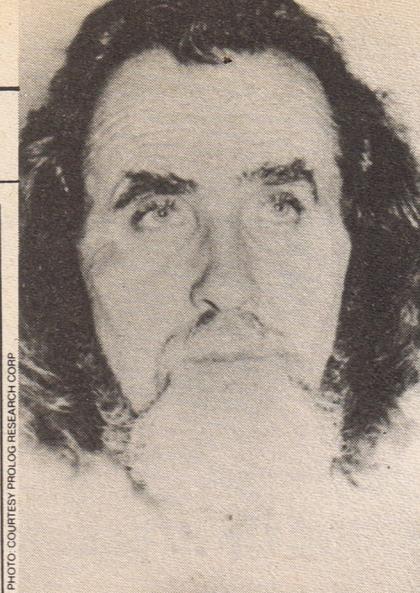


PHOTO COURTESY PROLOGO RESEARCH CORP

Berknyk is a member of Amnesty International himself, and a founding member of the unofficial Ukrainian Helsinki Monitoring Group—an organization set up to monitor the Soviet government's compliance with the human rights provisions in the 1975 Helsinki agreement. As such, he has come in for his share of governmental displeasure. In January 1972, he staged a 16-day hunger strike when the KGB confiscated two typewriters from his

home, and was consequently expelled from the Writer's Union of Ukraine, making it virtually impossible for him to earn his living as a writer. Later, in 1976, his association with the Helsinki group caused him to be detained for brief periods in April and December.

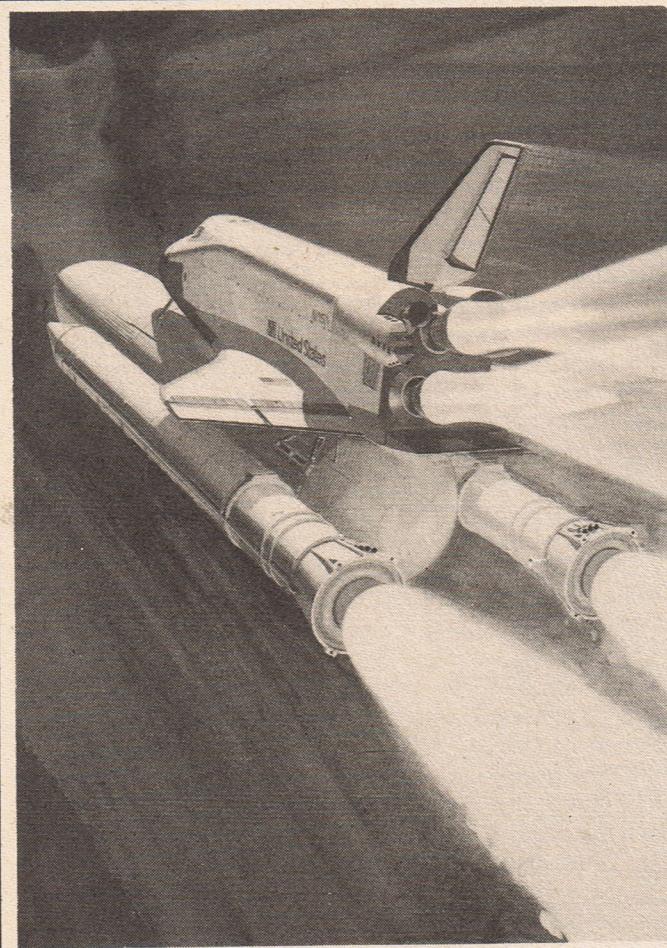
On March 6, 1979, Berknyk was arrested on a street in Kiev, and held for committing anti-Soviet propaganda and agitation. On December 21 he was sen-

tenced to six years in a strict-regimen labor camp and another three in exile.

One of Amnesty International's major weapons in trying to free what they call "prisoners of conscience" is to encourage people to send letters on behalf of those being held. By letting the authorities know that their victims are cared about by people around the world, it is possible to encourage the release of the prisoners and, at the very least, pressure the government to live up to their obligations under the U.N. Declaration of Human Rights and the 1975 Helsinki Agreement.

Any science fiction fans—in fact, anyone at all—who wish to do something for Oles Berknyk should write letters in English to the following address, courteously asking for his release: His Excellency Anatoly Dobrynin, Embassy of the U.S.S.R., 1125 16th Street NW, Washington, D.C. 20036.

—Barbara Krasnoff



SPACE AGE REVIEW



REPORTING THE HUMAN
MIGRATION INTO SPACE...

IN THE WINTER 1981 SPECIAL ISSUE

- ★ Space Shuttle Status Update
- ★ The New American Space Movement
- ★ Free Enterprise in Space
- ★ International Satellite Launch Schedule
- ★ The California Space Program
- ★ Europe in Space
- ★ Chinese-American Cooperation in the Space Age
- ★ U.N. Space Activities
- ★ Chronology of Major Space Events, November 1980
- ★ Calendar of Upcoming Space Events, Winter 1981

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Saturn

Voyager 1 gave us spectacular photos and a baffling set of mysteries.

By HARLAN ELLISON

And we beheld what no human eyes before ours had ever seen. The world outside was strictly alien. Heavy fog had been slithering across Southern California for two days. A 70-car daisy chain crackup on the Golden State Freeway had killed seven people the night before. Creeping through the hills past La Cañada-Flintridge, it was a scene Chesley Bonestell might have painted 30 years ago to illustrate an extrapolative article about the surface of Titan.

The time for patience with artists' renditions was at an end: I was on my way to see the actual surface of Titan. What no human eyes had ever beheld.

Tuesday, November 11, 1980. The Jet Propulsion Laboratory in Pasadena. NASA's Voyager 1 was on its way to closest approach with Saturn; with Titan and Tethys; with Mimas and Enceladus and Dione; with Rhea and Hyperion and Iapetus.

In the Von Kármán Center, where the press hordes had begun clogging up since 7 a.m., it was hurlyburly and business as usual. The women in the mission photo room were several decibels above hysterical: nothing but hands reaching in over the open top of the Dutch door demanding photo packets.

The press room is chockablock with science editors and stringers and lay reporters fighting to use the Hermes manuals lined up six deep. They are all there: the guys from *Science News* and *Omni*, the women from *Scientific American* and *Time*; heavyweight writers with their own word processors and Japanese correspondents festooned with cameras; ABC and NBC and CBS and Reuters and the AP. The stench of territorial im-

perative hangs thick in the crowd. I slip behind an empty typewriter and begin writing this column. An enormous shadow blocks my light. I look up over my shoulder at He Who Looms. "That's my typewriter," he says, of a machine placed there by JPL. What he means is that he got to it a little earlier than anyone else and has squatter's rights, as opposed to a sharing configuration. I smile. "Need it right now? Or can I have about ten minutes to get some thoughts down?" He doesn't smile. "I'm Mutual Radio," he says; in his umbrage that is surely explanation enough. My eyes widen with wonder. "Are you indeed? I always wondered what Mutual Radio looked like. And a nice job they did when they turned you out." I pull the paper out of the Hermes and vow tomorrow I'll *schlep* my own machine in.

They were standing in line at the coffee urns.

Everyone looked important.

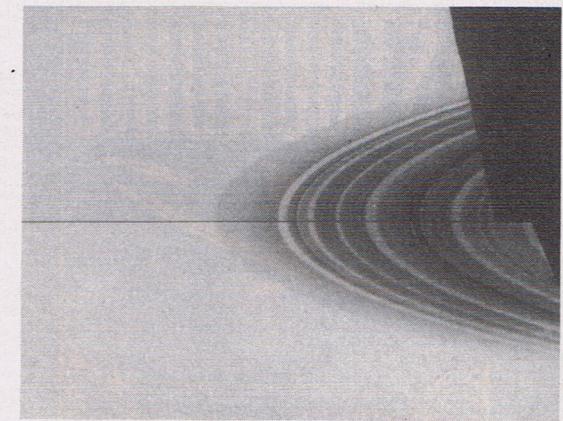
Everyone was watching to make sure no latest photo slipped past. And the JPL press liaisons were hiding the nifty Saturn buttons.

And everywhere the talk was of the mysterious "spokes" radiating out across Saturn's rings, of the 90-plus ring discovery, of the inexplicable darkness covering Titan's northern hemisphere.

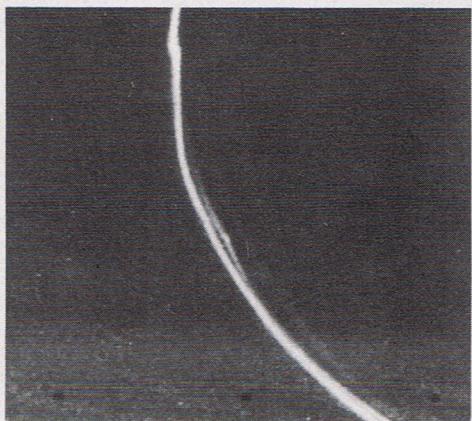
In the course of human events, far fewer are real than we are led to believe. The staged press conference, the artificial happenings, the protesting crowds that wander somnolently until the television cameras turn on them and they begin chanting, waving their fists. Planned, choreographed, manipulated—to make us believe great things are going down. But they are not. It is

The April 1939 cover of *Astounding* (inset) reveals a remarkably similar rendering of Saturn, as shown here in this Voyager photo. The artist was Charles Schneeman.

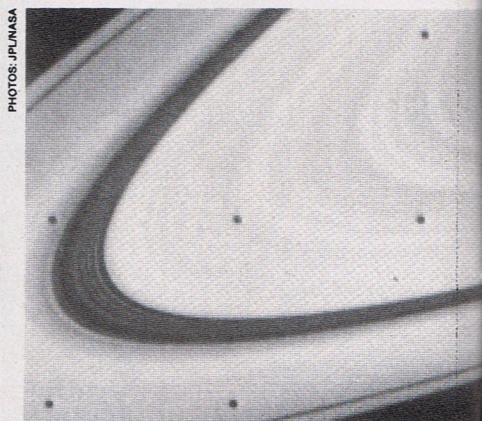




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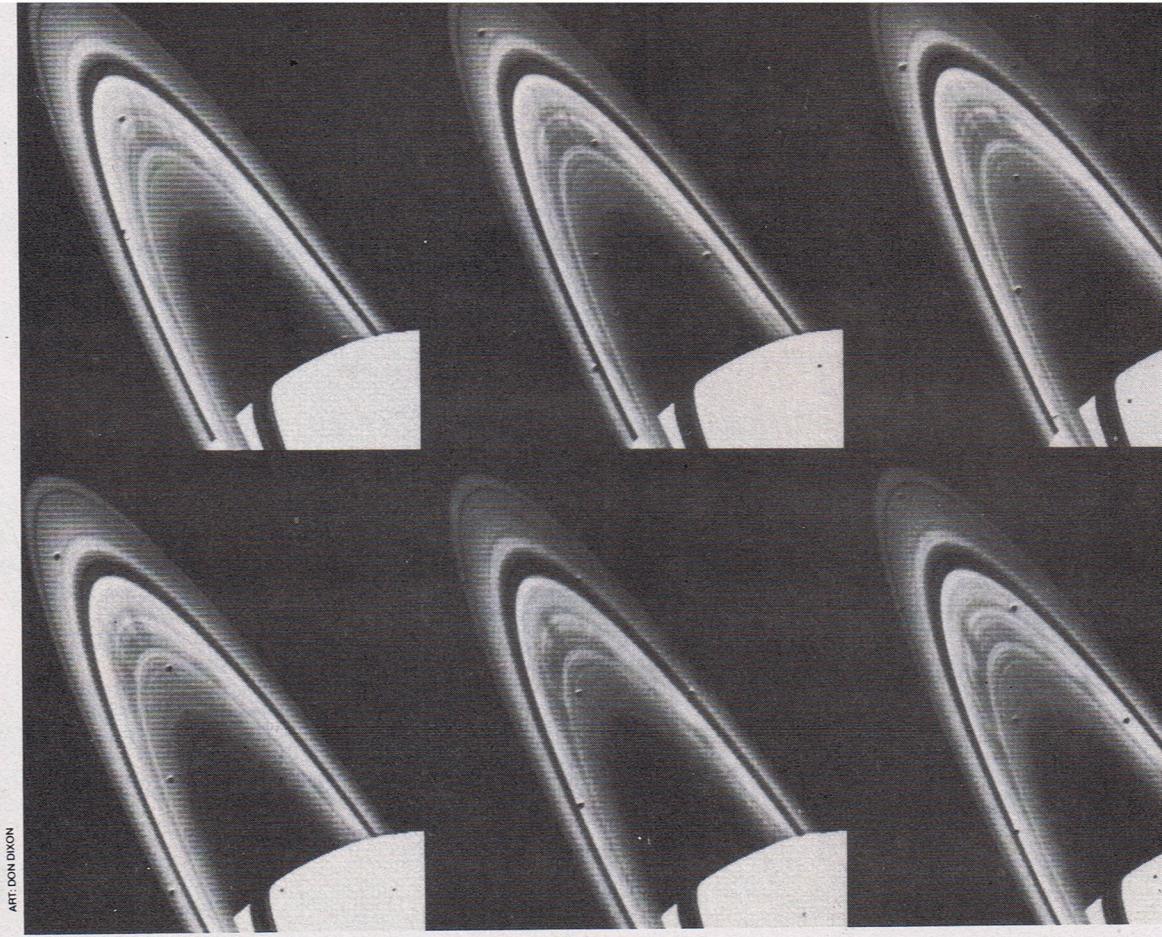
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PHOTOS: JPL/NASA

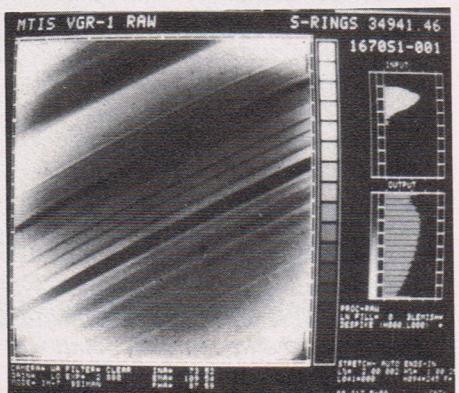
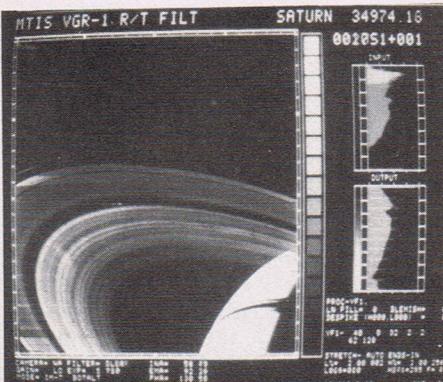
- 1) C ring in composite photo shows the ansa of the rings at top, and the leading ansa on the bottom.
- 2) The mysterious, "braided" F ring. The "knots" may be mini-moons.
- 3) The complex structure of the Cassini Division, bordered by the A and B rings.
- 4) Six views of the baffling "spokes."

Below: Don Dixon interpreted the rings as a rocky conglomeration in his painting "Saturn's Rings."



4)

Below: Homemade photos of Saturn and its remarkable rings. These images were photographed from monitors at JPL, and some were later color enhanced by the photographers, not NASA. To learn how you can do this for the Voyager 2 fly-by in August, turn to page 23.





David Egge "saw" this from one of Saturn's moons. Below are two photos of the real satellites that Voyager found orbiting the planet.

sound, it is fury, and as usual it signifies nothing. But occasionally there are genuine moments during which history is being made.

This was written by one of *The New Yorker's* unsigned editorial hands a number of years ago:

This is notoriously a time of crises, most of them false. A crisis is a turning point, and the affairs of the world don't turn as radically or as often as the daily newspapers would have us believe. Every so often, though, we're stopped dead by a crisis that we recognize at once as the genuine article; we recognize it not by its size (false crises can be made to look as big as real ones) but because in the course of it, for a measurable, anguished period—sometimes only minutes, sometimes hours, rarely as much as a day—nothing happens. Truly nothing. It is the moment of stasis between a deed that has been performed and must be responded to and the deed that will respond to it. At a false turning point, we nearly always know, within limits, what will happen next; at a true turning point, we not only know nothing, we know

(something much more extraordinary and more terrifying) that nobody knows. Truly nobody.

There are times when the world collectively holds its breath. The assassination of John Kennedy, the Cuban Missile Crisis, the day the Viet Nam War ended, the Manson Family murders, the Hungarian uprising in November 1956, Pearl Harbor, Hiroshima and Nagasaki. Real things were happening, the world was

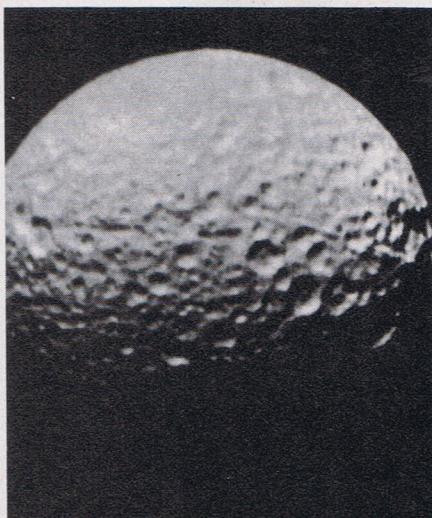
changing; the breath paused in our bodies.

And this is one of those timeless moments. Something real, something urgent, something important is happening.

The human race is fumbling toward the light through outer darkness; and there is a feeling here of movement, of genuine wonder. The sense of isolation dissipates.



The 11th moon, a pock-marked oddity.



Mimas, in all its cratered beauty.

PHOTOS: JPL/NASA

The press briefing is held half an hour earlier than expected and the room is jammed to the walls. A full-size replica of the Voyager bird dominates the left side of the briefing auditorium. The television networks have their Martian war-machine cameras ranged across the rear of the seating area behind the press representatives from major news outlets and, seemingly, from every Podunk Gazette in the country. Snatches of conversation in French, German, Japanese. The planet Earth is gathered here to know!

The recap of the previous day's findings leaves mouths gaping. They have discovered *something* on Tethys. Is it a crater? No, the albedo indicates it's a hill. The NASA spokesman calls it "a heck of a hill"—hundreds of kilometers across. But only time and greater resolution of the photographs will tell.

Brad Smith, leader of the imaging science team, cannot conceal his amazement as he reports that at least two eccentric rings have been found in the mass of circulars casting their shadow on Saturn's cloud-masses. He says they had no reason to expect such a thing, that it defies all the known laws of ring mechanics. What he doesn't say is that if every Bible Belt fundamentalist who believes we never actually went to the Moon, that we flew over to Glendale and shot all that stuff in a movie studio, could be here, to see what these people are doing, what is being sent back minute by minute over a distance of 930,000,000 miles, they might begin to understand that God was too busy creating esthetics to worry about putting the solar system together.

It is all so complex, so bewilderingly intricate, even the best minds in the room are finding it difficult to keep up with the new discoveries:

The rings, for instance.

A constant revelation. They simply don't know what keeps the rings separated. General knowledge, since the Dutch mathematician Christiaan Huygens discovered the true shape of the rings in 1659, has contended that—at most—there were five. (The state of our knowledge, and the breakneck acceleration in what we've learned, is expressed in this absolutely latest-thinking from *The World We Live In* [1955] edited not only by the staff of *Life* magazine, but by the renowned author of *The Universe and Dr. Einstein*, Lincoln Barnett: "Although Saturn's three concentric rings rotate in a circle 171,000 miles across, they are only a few inches thick. The middle ring, largest and brightest of the three, is 16,000 miles wide and separated from the outer by a 2,000-mile gap."

That latest-state-of-the-art in 1955 was a caption accompanying a Chesley Bonestell painting of Saturn's three rings.)

As of this November 18 the Voyager team has isolated almost 1,000 rings; and the estimates go as high as 10,000. The rings have rings; the ring's rings have rings; and the ring's ring's rings have ringlets.

But what keeps them separated...?

The *NASA News* backgrounder on the mission, dated just October 28, says this: "At least six rings surround Saturn. From the planet outward they are designated D, C, B, A, F and E. Divisions between the rings are believed to be caused by the three innermost satellites, Mimas, Enceladus and Tethys. The Cassini Division, a space between the B and the A ring, is the only division clearly visible with a small telescope from Earth."

But here it is less than two weeks later and we sit in the morning briefing and hear that the Cassini Division is anything but empty. Rings within rings within rings. And tiny satellites, acting as "sheepdogs" (Jerry Pournelle's wonderful term for them), seem to be holding the rings apart, seem to be serving as outriders in this complex, astounding system of cosmic detritus.

Science fiction writer Greg Bear asks Smith if he has any random guesses as to how old the rings are, how stable they are, and how long they'll stay in this wonderful sequence. We expect another humorous "well, I can't really say for sure" response, but Smith replies with force, "They're four and a half billion years old, they're very stable, and they'll

be there till the sun enters its red giant phase." Everyone is impressed.

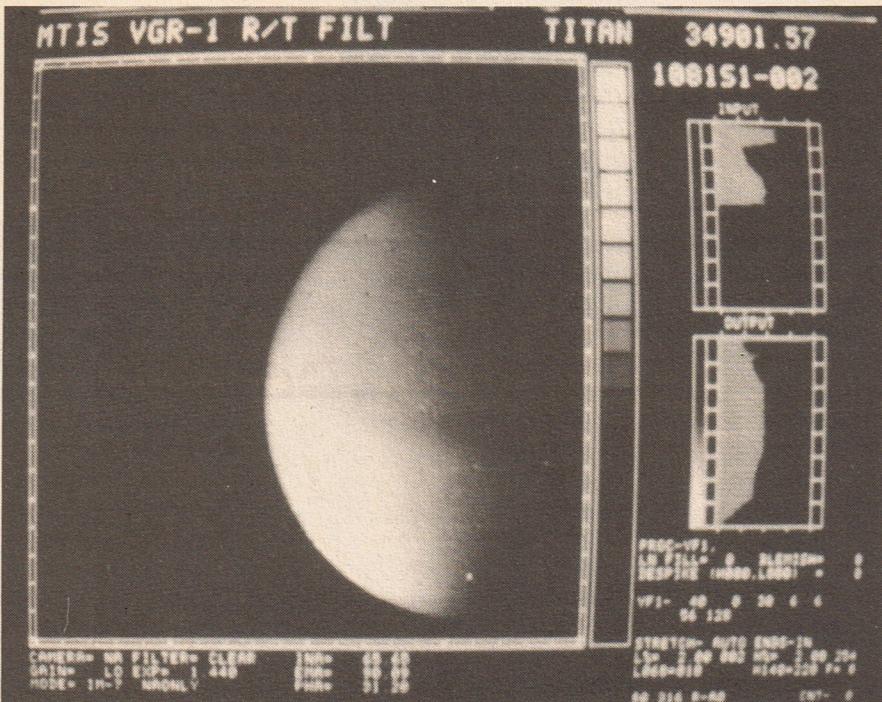
No one can even begin to grasp what four and a half billion years means in terms of waiting time at the airport, but it is clearly longer than next Thursday at 4:15 p.m.

* * *

Humanity is only 1.3 billion miles from the surface of Titan and one of the members of the press corps asks a dumb question. He didn't realize the NASA spokesman was making a subtle joke. An ingroup astronomical joke. His question is answered politely, but everyone in the room thanks God it was not s/he who had asked the dumb question. To look like a schmuck in the same room where Clyde Tombaugh, discoverer of Pluto, sits listening, is to put oneself forever beyond the pale. Five minutes later someone else asks a question to which the response is, "That's a very good question, a very important question," and He Who Asked could, at that moment, be elected President of the World.

I am an eyewitness to history, and I make a mental note to thank Jerry Pournelle for getting me VIP credentials; I am far out of my depth, but I am at the eye of the hurricane and I owe thanks to Jerry.

Slides from images sent back by the Voyager are flashed on the screen. Photos of the Cassini Division separating the A and B rings. The scientists admit that traditional celestial mechanics cannot account for the phenomenon of their eternal separation from one an-



Close inspection of the moon Titan was missed due to a heavy cloud cover.

other. Not even the "sheepdog" satellites can be adequately explained, the way they work, the way they push up and pull down the ice particles, speed them up and slow them down, keep them circling in their intricate cosmic pavane.

But they seem to revel in their lack of explanations. They suppose this, and they postulate that, and they are like kids who have been given a glimpse of a new toy with which they can play for years to come. It is the best part of this extraordinary game that has thrown \$400 million worth of Voyager I and II tinkertoy into eternal darkness. It is the most salutary part of the rigorously analytical intelligence: it loves to have been fooled, it loves to be surprised.

They realize they have made pronouncements of What the Laws of the Universe Are and are being proved wrong minute-by-minute. But they don't defend what they said in error; they admit, they recant, they rush to say no, here's what it is now, and here's what it looks like now, and look at *that*, and look at *that!* One can only love them for it.

They talk a great deal about seeing what's coming in with "Terrestrial eyes" and with "Jovian eyes." What they mean is that we are too ethnocen-

tric, that when Voyager 2 made its encounter with Jupiter 16 months ago, they interpreted what was relayed back through eyes and intellects chained to a Terran horizon for millions of years. Now, with bemused embarrassment, they admit to early misinterpretations of visual data because everything was viewed as if it were of the Earth... out there. But Ganymede brought important lessons about seeing with new eyes. Yet it's happening again—with the difference that "Ganymedian eyes" are being added to the viewing of the Saturn system. Nonetheless, how miraculous: seeing with the eyes of aliens. Knowing that what is revealed is only partially real, that much of the "reality" is merely shadow, as seen through human organs not yet completely retooled for new vistas.

These are human beings transcending their limitations, going to a new realm of perception not through the duplicity of drugs and fuzzy sophomoric metaphysics that demean the purity of Zen rigors, but through confrontation with the pragmatic universe, through hard analysis of the laws of that physical universe, no matter how anomalous and labyrinthine they may be.

Angie Dickinson appears in the briefing auditorium and the PIO nabobs be-

gin whirling like dervishes. She is there strictly as an "interested bystander" I'm told, but she gets more attention than Clyde Tombaugh. I sigh deeply.

* * *

Voyager has discovered three new satellites: S-13, S-14 and S-15. And they have "undiscovered" one that has been there since 1966.

Quote from the current edition of *The World Almanac and Book of Facts*, 1980 (page 761):

Saturn has 10 satellites, the 10th having been announced by the French astronomer, Audouin Dollfus, in Dec. 1966. The new satellite is a few thousand miles outside Saturn's ring system, but it is so faint that there is some doubt as to its existence.

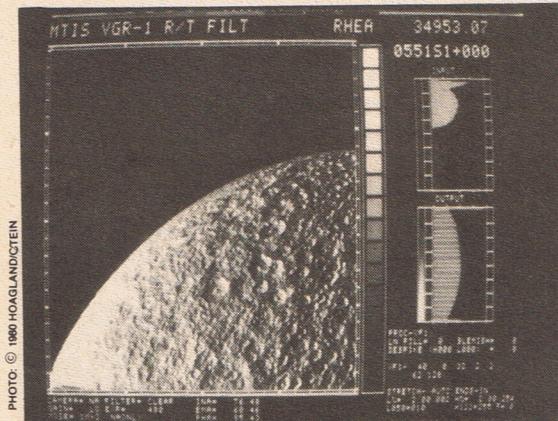
Quick thinking, *World Almanac!* Dollfus's tenth satellite, which he called Janus after the two-faced Roman deity, does not exist. Poor Dollfus. It simply ain't there. Every science fiction story using Janus as its locale is now down the chute. (I gloat. I am not a science fiction writer, no matter how my work is mislabeled by anal-retentive pigeonholers; I have written so few stories that required a scientific education that I have nothing to apologize for. I feel sorry for Hal Clement and Isaac and Poul and Larry Niven. Only Andre Norton can get away with it: her *Judgment on Janus* was written in 1963, before Dollfus's gaffe, and she made her Janus an alien world in another star-system.)

The bird makes its closest approach to Titan, largest satellite in the solar system and the only one with a discernible atmosphere, at 9:41:12:12 Tuesday night and the final hope that a view through to the naked surface will be possible... vanishes. One of the scientists, who bet a case of cognac that a peep would be possible, loses the wager. And we all lose. Titan is covered with smog. Clouds of liquid nitrogen vapor, but maybe the atmosphere isn't a nitrogen mixture. Hydrogen cyanide is discovered; there may be an ocean of liquid nitrogen down there; if such an ocean exists, the methane icebergs would sink to the bottom.

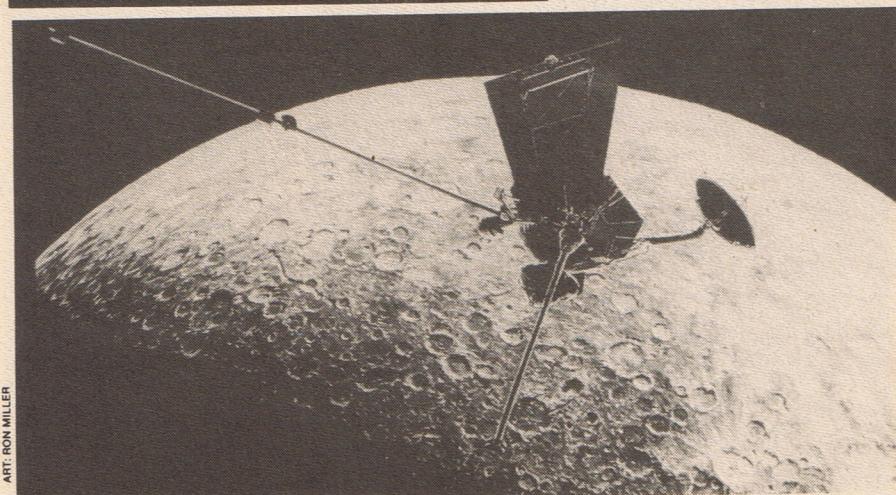
Much of the human race would not spend four dollars to journey to Los Angeles, blanketed by photochemical smog; but the species *in toto* has traveled one and a half billion miles to visit a place with even worse smog.

And on the evening news as I drive home, talk of the Saturn flyby appears at the bottom of the broadcast. Top spot dwells on the war between Iran and Iraq.

I sigh deeply.



Voyager came awfully close to duplicating Ron's painting.



Artist Ron Miller imagined Voyager over Saturn's moon

Wednesday, the 12th of November, 1980. The 10:30 a.m. briefing on the day of the main events:

2:16 p.m. Closest approach to Tethys (258,000 miles).

3:35 p.m. Closest approach to Saturn (77,174 miles above clouds).

3:48 p.m. Six photos of the new satellite, S-11.

5:42 p.m. Closest approach to Mimas (55,168 miles).

5:50 p.m. Closest approach to Enceladus (125,840 miles); Enceladus' radius is 260 kilometers, 162 miles; Earth receive time of the images: 7:15 p.m.

7:39 p.m. Closest approach to Dione (100,122 miles).

9:45 p.m. Voyager crosses the ring plane on its outbound leg.

10:21 p.m. Closest approach to Rhea (44,744 miles); Rhea's radius is 750 kilometers, 466 miles.

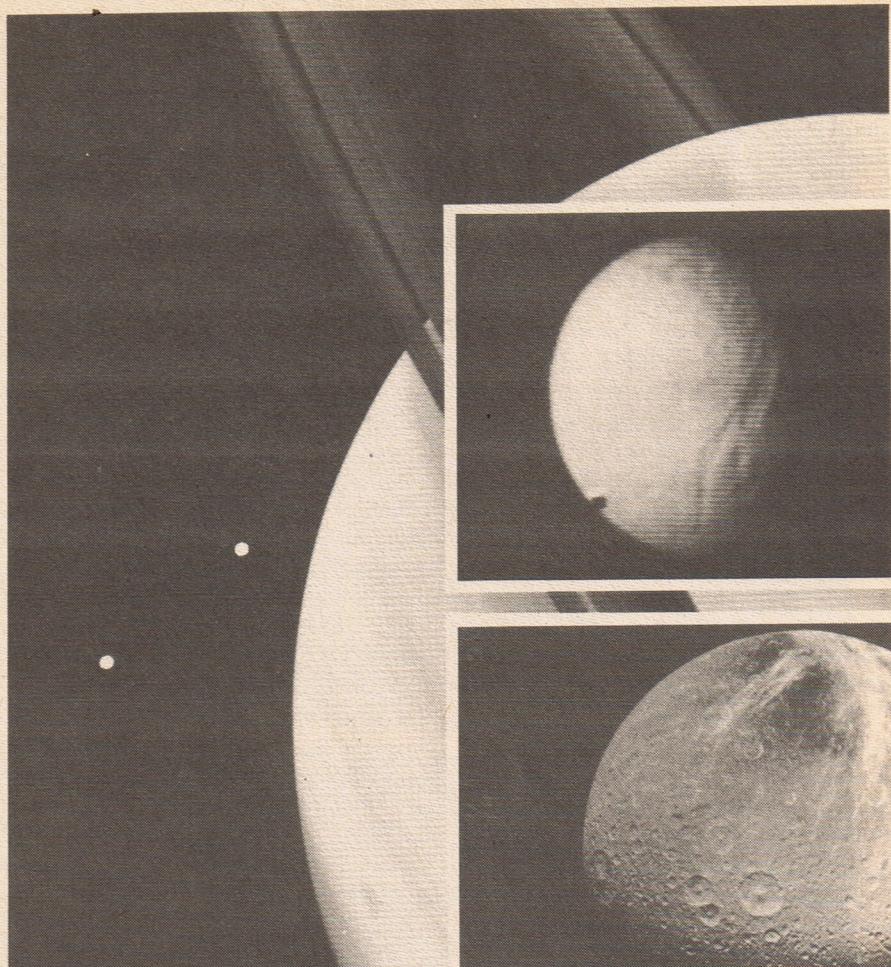
Quote from *Star & Sky* magazine, November 1980:

An object like Saturn's satellite Rhea, which appears as a minute speck in any earthly telescope, can be used to illustrate what the Voyagers are expected to achieve. No surface features on Rhea have ever been seen. The photos from Voyager 1 will include images of Rhea displaying about 20 percent of its surface to nearly one-mile resolution—equivalent to the best Earth-based telescopic photographs of our own satellite, the moon.

A quick and infallible test of the imagination quotient of your friends and lovers. Quote the above; if s/he says, "So what?" or "What good is that?" ask for your ring back and walk away fast.

The briefing is even more jammed than yesterday's. I sit with Dick Hoagland of *Star & Sky* so he can explain everything to me. I need to know what albedo means. I'm sure he'll be tickled to explain the ABC's of celestial mechanics to a no-neck scientific illiterate. (At least I don't have to arm-wrestle Mutual Radio for a typewriter. I've brought my own Olympia portable—the one with the Mickey Mouse decal on the case—and I snag a desk formerly occupied by Peter Schroeder of Dutch television and radio. It's a good thing I got there early: Tuesday's smash&grab for mission photos and space to bat out news copy has intensified. One yahoo caught rustling a CBS word processor is lynched before our eyes.

Opening remarks by Voyager Project Manager for JPL, Ray Heacock, reinforces the sense of wonder. They have



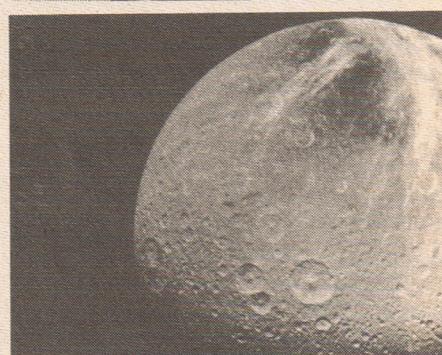
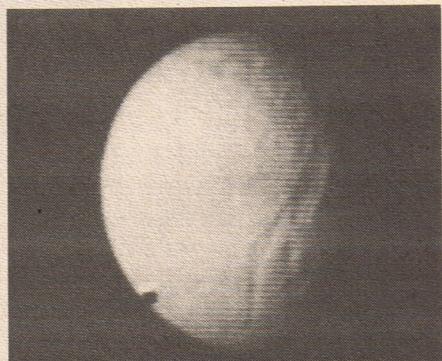
Saturn and its moons Tethys (above, and above in inset) and Dione. While Tethys resembles a tennis ball, Dione looks remarkably like our own moon.

been incredibly lucky overnight. During the Titan-Earth occultation period—11:12 to 11:24 p.m.—there has been rain at tracking station 63 in Spain. It started and stopped during a time when, had the spacecraft not been measuring atmospheric properties as the radio signal continued to fade, we would have lost masses of valuable data. But it didn't matter during occultation.

More wonder: Heacock says, with an impish grin, that they made an error in timing: because they didn't know precisely where Titan would be (or something like that), the Voyager made the ring plane crossing 49 seconds earlier than expected. Everyone laughs. The bird has been in transit for three years and the biggest miscalculation is 49 seconds. The next time I call the telephone company about a repair and they tell me it can't be done, I will tell them *anything* can be done.

I smile with pride at my lovely species. We ain't so goddam dumb after all.

(Middle of the day Tuesday, a slow time with everybody out to lunch, I went to the astonishing botanical gardens of the Huntington Museum with Jane Mackenzie and Bob Silverberg. We



PHOTOS: JPL/NASA

wandered through alien terrain straight out of a 1936 Frank R. Paul cover from *Amazing Stories*, a desert garden of a million kinds of seemingly extraterrestrial cacti. And Bob ruminated. "I was standing next to one of those scientists at the back of the auditorium during briefing," he said, "when he was describing something incredibly arcane; and I looked at him. I was looking at something like 180 I.Q. and I knew that man was smarter than I. Far smarter. And I'm smart."

The briefing goes on. Norman Ness, from the Goddard Space Flight Center, principal investigator on the magnetic field team, explains how the Voyager passed through Saturn's bow shock wave at 4:50 p.m. when Titan was inside the magnetic field envelope of the planet. He speaks of the solar wind, the flow of ionized gas given off by the sun that hisses through the solar system. There is no poetry in the words...only in the way he speaks of it. Norman Ness barely realizes he has looked on the face of the Almighty.

The photos we're seeing are four times as detailed as what came in over the TV screens real-time. Television's

scanning pattern permits only one-quarter of the information contained in the photos sent by the Voyager's imaging systems to reveal itself when we see it on the screen. Even so, the details are remarkable.

But most remarkable of all is the revelation that three components of the F ring seem to defy the laws of pure orbital mechanics: they are braided. Such a thing cannot be, yet we look at the photographs and we see that indeed, the rings do twine. Brad Smith of the University of Arizona is totally at a loss to explain it. He cannot even make a joke. This is the big time, something never encountered before. He looks like a man stunned by the hammer. He says that of all the improbables he might have postulated, even to the inclusion of eccentric rings, which have now been verified, the braiding is so far off the wall he could not even have conceived of it.

We stare at the pictures.

The rings twine around each other. The room falls silent for a moment, we hold our breath; we are living in one of those special moments when *something is happening*, something important.

The celestial engineer has been cutting capers again.

A photo of Mimas taken at 5:05 a.m. Pacific Standard Time from a range of approximately 400,000 miles shows an impact crater 80 miles in diameter. It shows a rebound peak God only knows how high in the center of the structure. The crater is more than a quarter of the diameter of the whole damned iceball. It may be the largest impact crater, relative to the size of the object struck, in the solar system. What will the shock pattern on the other side of Mimas look like? What will it tell us about how big a projectile can be before it blows something like our moon to smithereens?

That's why you asked for your ring back and walked away fast when the feep didn't understand.

During the press conference—between 10:53 and 10:56 a.m.—the mechanism making search-sweeps for new satellites apparently discovered S-16. Later it turns out to be S-10.

Patrick Moore, he who knows more about our moon than anyone else writing about Luna, asks Smith about a small satellite that might be controlling the inside boundary of the C ring. Smith gets an expression that is the equivalent of crossing one's fingers and responds that he *hopes* it's there... because if it's there it will go a long way to explaining how the rings hold together. He says they will modify the Voyager 2 search

patterns to locate it... if it's there.

It becomes clear that the photos we're being given for publication are merely bullshit PR. That as soon as this circus leaves town the scientists upstairs can employ full computer time to analyze the pictures instead of putting together "pretty pictures" for the press.

And that's exactly what happens.

Within two days, they have analyzed so much of the material that they've revealed a wind on the surface of Saturn that blows at 1,100 miles per hour. If that wind were here on Earth it would be blowing in a steady line from Philadelphia to Buenos Aires.

And then comes the explanation for the anomalous "spokes" that were seen radiating out through the rings. It is an explanation so unbelievable that it can only be termed a *Star Wars* special effect.

As the Voyager fell through the ring plane on the 12th, heading for its closest encounter with Saturn, a secondary experiment on board—"The Planetary Radio-Astronomy Receiver"—picked up enormous bursts of energy—static—identical to terrestrial thunderstorm noises... but a million times stronger than anything in the solar system.

The bursts of energy coincided with the mysterious "spokes" seen in the rings.

Putting the results together, the Voyager team has tentatively come up with an awesome mechanism operating within the ring, namely, electrical discharges—lightning—occurring over tens of thousands of miles.*

The Voyager was literally being shot at by Saturn as it flew past. The "spokes" seem to be—hold your breath—enormous linear particle accelerators!

As best I can explain it to you (and most of this comes from Dick Hoagland), here's what causes this phenomenon that cannot be explained within the parameters of known celestial mechanics.

The density of material in the B, or center, ring is the highest. The highest number of, literally, small icebergs or snowballs per cubic mile. Because of the inevitability of Keplerian mechanics, the bergs closest to Saturn are orbiting faster. Any ice object with an eccentric

orbit, even a few meters of eccentricity, will collide with other bergs. Because of the brittleness and cold of this ice they naturally fracture producing, well, producing chips off the old block. Then those fragments collide and chip again and again, getting smaller and smaller. These collisions continue in a never-ending rubble-producing process.

But. When this occurs in Saturn's two-hour shadow, when the fragments sail out into sunlight the smallest particles—micron-size, perhaps—are charged up by interaction with solar ultraviolet light and, because like charges repel as any dummy clearly knows, they literally try to get away from the rings. Producing a levitating cloud of charged ice crystals elevated above the average ring plane who knows how far... several microns to possibly several hundred miles.

Grabbed by Saturn's magnetic field (magnetic fields and electrical charges, Hoagland assures me, go hand-in-hand), they are lined up in a linear feature tens of thousands of miles long, extending inward and outward from within the center of the B ring in toward Saturn. These appear in the optical images as "spokes" which rotate anomalously around the planet defying all explanation. At this moment.

Give them a week more.

And so these electrified ice crystals apparently discharge along the length of the spoke creating, in effect, the solar system's largest radio transmitter as well as a natural linear particle accelerator.

Even I, scientific illiterate, aware of the breakthroughs in particle physics that have come from such terrestrial plants as the Batavia, Illinois, proton synchrotron, can extrapolate what it would mean to harness that "spoke" mechanism to aid us in discovering precisely of what matter is composed, how it works, how it came to be.

Explain that to the feep who said, "So what?"

I overload. I cannot contain many more new information. I pack it in and lie down and turn on the radio.

The news is all taken up with how high the stock market has jumped with Reagan's latest fiscal pronouncements. And the war between Iraq and Iran. I close my eyes and slap the button off on the radio.

I sigh deeply. Ain't we a wonderful species.

*Harlan's article was written on the spot at the JPL center on November 12 and 13. The theory on the "spokes" stated here is just that: one of many theories now being studied by the Voyager team. Which only serves to further the sense of mystery that exists with the information relayed by Voyager 1. With past planetary encounters, most new information could be explained within a matter of hours or at least days, whereas much of the Saturn material has scientists baffled. They are presently rethinking a lot of past theories. It is exciting, to say the very least. FUTURE LIFE will continue to report on the riddles of Saturn as they become available.—Editor

Thanks are also extended by the Author for the invaluable assistance of Burt Handelsman of radio station KPFK, Pacifica in Los Angeles, without whose help....

Voyager Video

When Voyager 2 flies by Saturn in August, you can take your own photos.

By RICHARD C. HOAGLAND & CTEIN

The color photograph (right) and the two black and whites on page 17, were constructed from the black-and-white images sent back from Saturn by Voyager 1. However, they were constructed by the authors, not by NASA. You can make your own color pictures when Voyager 2 flies by next August—and you don't need a computer. You can use a 35mm camera and tripod, a B&W television and three slide projectors. NASA's pictures are of higher quality, but there is a thrill to making your own.

Voyager's B&W pictures, which are shot through color filters, are displayed at JPL on TV monitors and provided to many TV stations (especially PBS). Try to get successive images shot through different-colored filters. (Filter colors are designated on the monitor screen.) If you have a friend with a video recorder, we suggest you tape the pictures so you can play with them at your leisure.

In any case, the first step is to make B&W slides from the TV images. Adjust the TV controls to give low contrast and moderate brightness; you must be able to clearly see both the lightest and darkest tones of the images. Make sure that these settings aren't changed between exposures.

Use Kodak Rapid Process Copy Film, which develops directly as slides. The approximate film speed for TV is 0.12; your exposure will probably be between 10 and 20 seconds at f/1.4. If possible, make some test exposures ahead of time.

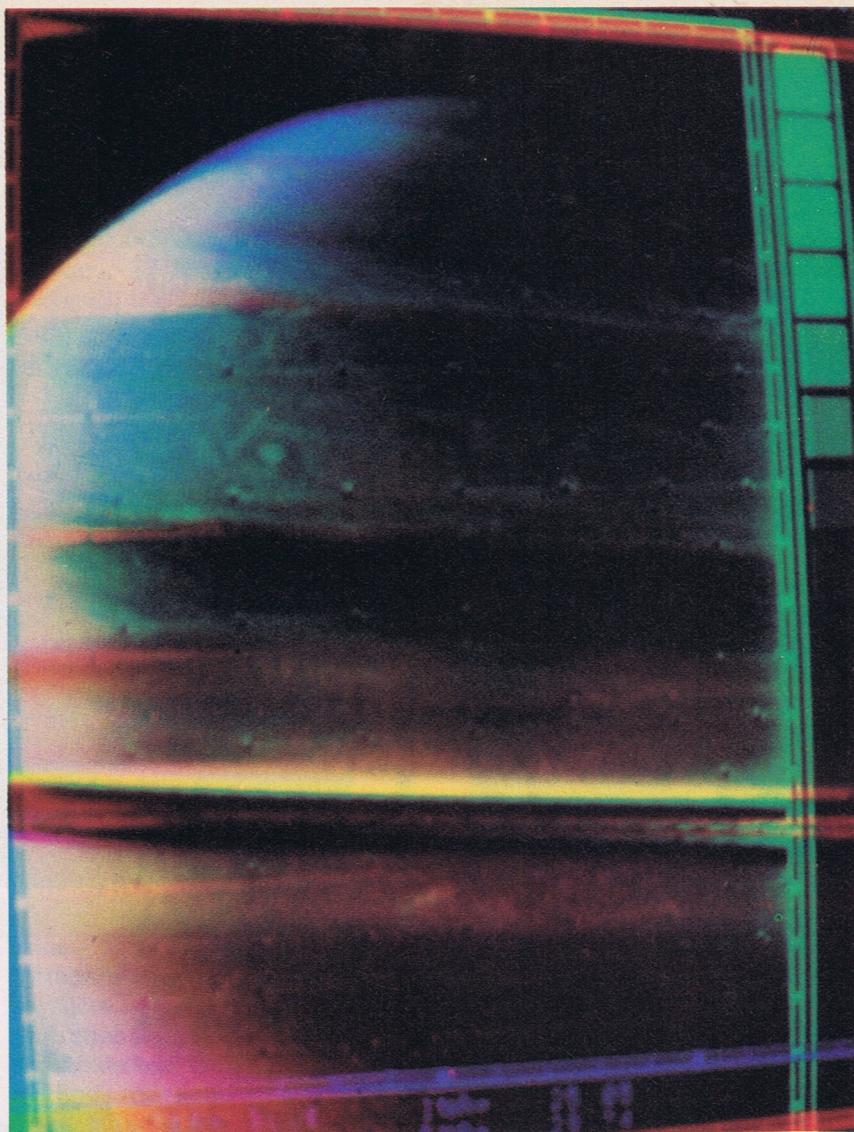
Develop the film in undiluted DK-50 at 21 degrees C. Agitate every 30 seconds for five minutes. Rinse the film with water for 30 seconds and fix for five minutes. Wash for 20 minutes and then dry the film.

These B&W slides are projected through color filters from three closely spaced projectors with zoom lenses. Put red, blue and green filters in the projectors (we recommend Wratten #'s 25, 47A and 58). Tape two pieces of polarizing plastic (like that used to filter photoflood lamps) to the front of each lens. By rotating one of the polarizers, you can vary the brightness of the projected image. Do not use dimmer controls—they can damage projectors.

The Voyager spacecraft moves between exposures, so the three images may be of different sizes and in different parts of the frame. Adjust the zooms and jockey the projectors around until the images coincide. Do this by turning off one projector and aligning the other two. Then add and align the third image to the first two.

Rotate the polarizers to get the color the way you like it. You can rephotograph the projected image on tungsten-balanced Ektachrome film. Bracket your exposures generously at the meter reading.

Don't expect totally realistic or accurate results. For that, you need sophisticated computer systems. Still, you can produce spectacular results by these techniques. Imagine showing your own color slides of Saturn the next time friends drop over. After all, your "share" of the Voyager cost is about a nickel per planet, so they really are your pictures. Good luck.



Above: Color-enhanced Saturn, as "seen" by the authors. Below: NASA's false color of Saturn's southern hemisphere. The differences are subtle.

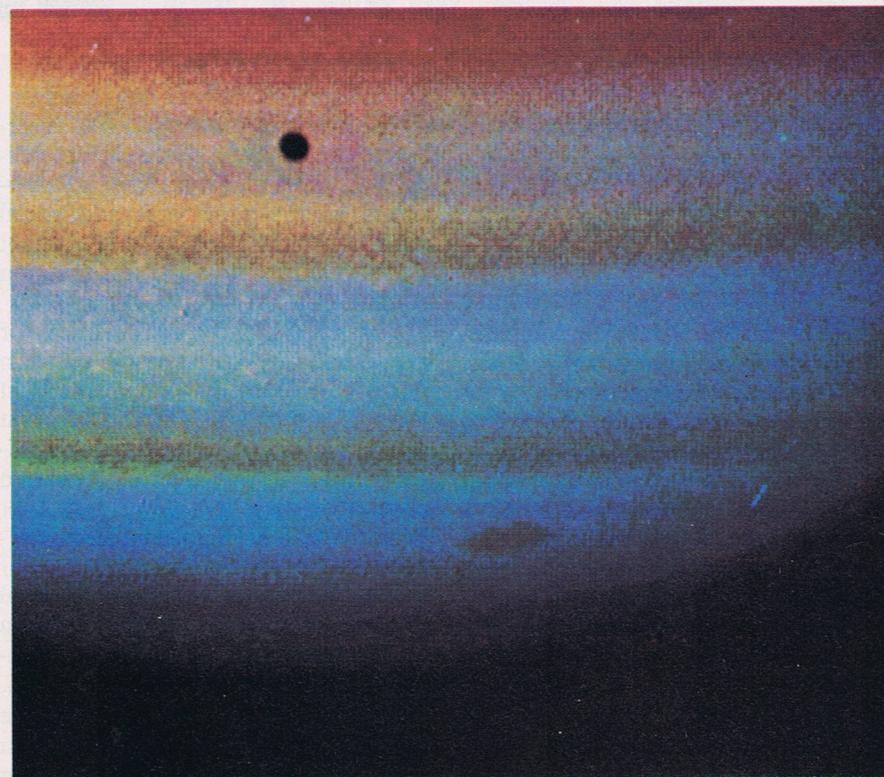


PHOTO: © 1980 HOAGLAND/CTEIN



PHOTO: BILL VARIE

The Graying Earth

By NED MADDEN

"Man is as old as his connective tissue."

—Alexander A. Bogomoletz
The Prolongation of Life

For all its notable accomplishments, the 20th century will most probably be remembered by future generations as the age in which humanity finally grew up. This century will hold particular interest for persons looking nostalgically back across the ages, back to the exquisite excitement of the mid-to-late-1900s when so many wonderful things occurred, remembering the time in which they were born.

Yes, people alive today, especially the young, may well be thriving centuries hence, the first generation of the "Ageless" who unlocked the secrets of pre-

serving connective tissue indefinitely.

The evidence pointing in that direction abounds. It can be seen in biomedical and genetic advances, in developments in the behavioral and social sciences, in profound changes wrought by the technology and information revolution.

The story of how we qualified for near-immortality and became our own posterity will rank high among the great legends of our race. The roots of that story trace back to the medieval alchemical world which gave birth to modern physical science. But it was only after World War II that human intellectual efforts were able to significantly lower our species' deathrates, advance the world population's median age and create a vigorous and robust lengthened life expectancy.

It took millions of years of struggle for our survival as a species. Now, late in the 20th century, we have finally begun

to fight for our lives as individuals. This era will produce the initial large-scale aging of humanity—"the Graying Earth" which precedes the ages of the "Immortals."

Population

"...During the next 5,000 years, at the present rate of [population] increase, we will run out of not merely the planet, but of the entire universe..."

—Isaac Asimov
Catastrophes

As Asimov himself asserts following his harrowing picture of an overpopulated future, it will never happen. Throughout the world, birthrates have declined. The World Bank estimates a rise in world population from 4.4 billion today to six billion in the next 20 years. But demographers expect it to stabilize by the year 2010 or so. A stable population is an aging population, and throughout the world the graying of

In the year 2000, the majority of people will be over age 55. Will we be ready?

Earth proceeds.

In all "developed" countries, life expectancies have risen dramatically. When the United States introduced governmental pensions in the Social Security legislation of 1935, the actuaries counted on a median life expectancy of 58 years for men. It is now almost 70 and rising.

Management expert Peter Drucker—everybody's favorite population prognosticator today—predicts that, "People aged 55 and over, the age when people first begin to be conscious of retirement and of the need to provide for their old age, will constitute a majority or near-majority of the adult population in every developed country by the year 2000."

As for the developing Third World—Southeast Asia, Africa, Latin America, Asia, China—the Graying Earth trend will eventually also reach them.

According to Drucker, the important population change in the developing countries after World War II was the drastic drop in infant mortality. "It is not that birthrates increased—this widely held belief is a misunderstanding," writes Drucker. "Birthrates actually have declined everywhere. But survival rates have gone up faster than birthrates have fallen."

The key factors in increasing survival rates have been the significant advances

in biology, health care and medicine which drastically decreased infant mortality and prolonged the lives of millions of aging adults.

In 1900, life expectancy in the United States was only about 40 years. Two million years ago, the lifespan of our ancestor *Australopithecus Africanus* was only 20 years. Today, people live on the average almost twice as long as they did at the beginning of the century. One aging expert calls this phenomenal increase in the rate of survival the "Ultimate Revolution."

According to author Saul Kent, who wrote *The Life Extension Revolution*, we are now in a position to challenge the most basic of our enemies, aging and death, through the "3 Rs" of anti-aging therapy: Rejuvenation, Regeneration and Repair.

Kent estimates that by the year 2000 we may be able to prevent the age-related decline of the immune and neuro-endocrine systems, gain control over cardiovascular disease, cancer and diabetes, achieve liquid-state suspended animation in humans and acquire the ability to restore some vigor in the elderly.

By the year 2025 we may be able to extend our maximum life span radically by gaining control over the aging process. By then, we will probably possess highly advanced methods of rejuvenation, regeneration and repair of aging, disease and accident victims, as well as perfected methods of solid-state suspended animation.

Beyond then, even the most knowledgeable futurists can only speculate as to the eventual transformation of the human condition. Immortality may or may not be in the cards, depending on which expert one talks to. However, clues about our future abound in the incipient efforts of a wide range of specialists now challenging Time itself.

Cellular Therapy

"...Yes, the wee creatures that inhabit the bodies of us germs, and feed upon us, and rot us with disease. Ah, what could they have been created for? They give us pain, they make our lives miserable, they murder us—and where is the use of it all, where the wisdom?"

—Mark Twain
*Three Thousand Years
Among the Microbes*

It is the "wee creatures" of which we're made that scientists look to when seeking out the causes of aging. The tiny cells that comprise our organs, the microbes and micro-organisms that call us home—the processes whereby this microcosmic life first forms, flourishes and

then fades determine our individual fates.

Biologists agree that aging is a two-part genetic and environmental process, and the internal and external entropic forces of nature burn toward our life center like a double-lit fuse. Our cells replicate increasingly poorer quality offspring, and succeeding cell generations are less and less adequate in resisting the assaults of infectious diseases, contaminated and cholesterol-laden food, polluted air and impure water, radioactive and chemical wastes, destructive sunlight, stress from urban crowding and a host of other hazards. Heredity and habitat hold us in a squeeze play.

Yet even under perfect conditions, the maximum lifespan is no more than 120 years. In laboratories, normal (non-cancerous) cells lose the ability to divide or split after 50 doublings. This boundary, established by Leonard Hayflick in 1961, is known as the "Hayflick limit." Thus some scientists say we each possess an internal, cellular clock of aging, ticking away our allotted span moment by moment.

To beat the clock, geneticists work with DNA, the "building block of life" which synthesizes life-sustaining proteins and carries in its coiled strands the genetic code that is passed on from generation to generation in the genes of the chromosomes that make us all distinct and unique creatures.

DNA (deoxyribonucleic acid) and RNA (ribonucleic acid) are complex protein molecules found in the nucleus of every cell. Our skin, hair color, facial appearance and other characteristics are all designed, coordinated and to a large degree predetermined by our own individual DNA, and the information is passed along to descending cell lineages by our RNA.

It could be that this process breaks down after our procreative years have passed, and that DNA activates genes to dismantle the all-essential protein synthesis and disrupt our biological functions. Or DNA could erode from the cumulative effect of random mutations. Or the tiny areas on the surface of each cell which usually recognize the hormone command to make more DNA could deteriorate over a time and fail to respond to the hormone's command to reproduce, thus causing cell senescence.

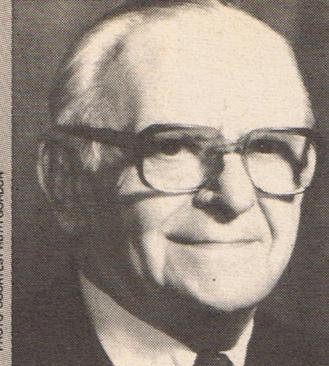
We do not know for sure what happens at this basic level. Nonetheless, scientists regard cell therapy as a crucial aspect in the fight against geriatric conditions such as arthritis, diabetes, anemias and hardening of the arteries, not to mention cancer. These ills are thought to



George Burns



Ruth Gordon



Armand Hammer



Robert Moses

be the result of auto-immune disease, a condition in which the body's immune system becomes incapable of discriminating between "self" and "foe" and begins producing antibodies and killer lymphocytes which attack the body's own tissues. An incompetent immune system results from the general deterioration of bodily organs whose cells have grown weak and increasingly poor in quality. The goal of genetic engineering in healing is to revitalize and rejuvenate individual cells, revitalizing and rejuvenating the entire organism in the process.

Cell rejuvenation was first devised by Paul Niehans, who began to treat patients (including Pope Pius XII) with live cell suspensions from freshly slaughtered fetal lambs in the 1930s. A Who's Who of the world's wealthy and famous have trekked to the Clinique La Prairie in Clarens-Montreux, Switzerland, to be "revitalized" by injections of fetal cells from black mountain sheep.

Other methods of cell therapy are practiced in clinics throughout Europe. In one method cells are freeze-dried, frozen to -40 degrees C and subsequently thawed for use in treatment. In another therapy, Dr. Alfred Pfister developed "cellvital," a method in which cells are placed into a fluid that keeps them "breathing" for weeks.

Then there is a vast array of life-promoting elixirs—vitamins, minerals and herbal remedies advocated by nutritionists, therapists and practitioners of holistic healing who seek a preventative approach to medicine and fighting the ravages of aging.

There is the youth drug Gerovital-H₃, also called procaine. Developed by Dr. Ana Aslan in 1951, procaine is claimed to be of major therapeutic value in the treatment of depression, severe arthritis, loss of sex drive, loss of vitality, hypertension, wrinkled skin and numerous conditions associated with the aging process. A synthetic crystalline compound resembling, but less toxic than, cocaine, its value is said to stem from in-

ducing the formation of red blood cells, the body's oxygen carriers.

Calcium pangamate, or Vitamin B₁₅, is said to lower blood pressure, normalize blood cholesterol levels, keep arteries free from fatty deposits and prevent and cure heart disease. This vitamin is used by the Russians to extend cell lifespan, stimulate immune responses, transport energy, synthesize protein, protect some organs and fight a variety of diseases.

Ginseng is a 2,000-year-old reputed aphrodisiac. The root has been employed by the Chinese for medicinal purposes for centuries.

In pharmacognosy, the study of medicinal botanical plants, lavender, sage, rosemary and nettle are used to clear the body of parasites, detoxify and cleanse the blood and lymph systems, kill unwanted bacteria and stimulate and nourish the body.

Our connective tissue is almost 70 percent soluble collagen and elastin woven together with the sebaceous glands and the blood vessels, which, along with hair, are appendages of the skin. Dermatologists apply nutritive creams containing soluble collagens and elastin to the skin's surface in order to condition underlying forming cells with moisture, natural nourishment and oxygen enrichment. They prescribe dietary supplements containing vitamins, minerals, amino acids, glandular extracts and enzymes to enhance skin cells and bolster sagging skin tissues.

Found on every square inch of the body except the palms of hands and soles of feet, hair serves to regulate temperature through the trapping and releasing of air. Although humans tend to think of head hair as mainly decorative, it is affected by and affects sex and defensive postures as well. Factors contributing to hair loss include stress, hormone changes, sexual stress and frustration, improper diet, lack of exercise, the advent of puberty and harsh hair-care products. Hair turns gray when the central cortex of each individual fiber ceases to make pigmentation. The hair

becomes transparent, but light passing through it makes it look white. Surrounded by darker hair, it appears an overall gray.

Increasing importance is being placed on hair quality, since hair is one of the earliest and most easily accessible tissues to reflect subtle changes in body chemistry. A simple snip of hair may soon be useful in early detection of cancer, diabetes and other serious illnesses. To preserve and restore full, healthy heads of hair, nutritionists are experimenting with B-complex vitamins, proteins, nucleic acid gels and nutritive shampoos and conditioners as well as scalp cleansers.

By the end of this century, graying and aging may no longer be synonymous, making the title of this article the mark of a period in human history as bygone as the days of the smallpox face.

The list of youth-promoting substances runs on and on, but Rejuvenation is just a part of the life extension movement. The 3 R's also include Regeneration and Repair.

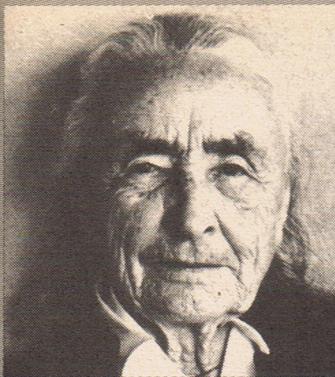
Tissue transplants are forerunners of the approach of a suitable cloning technique, when everyone can have his or her own personal set of "spare parts," developed from frozen organ cells and transplanted without the usual rejection problems in time to replace worn-out originals.

Electrotherapy, already being used to accelerate healing in bone injuries that previously would have required amputation, could evolve into limb regeneration a la the salamander.

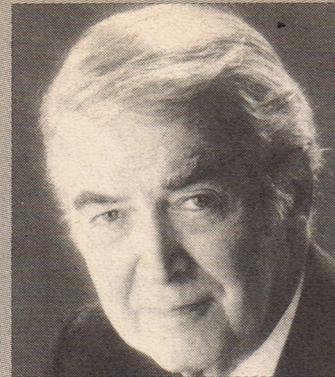
Hybrid body parts—half-natural, half-manufactured—will make the custom-designed organ business a colossal enterprise when the aging population finds itself in the mass market for artificial hearts, heart-assist pumps, electronic vision and hearing devices and a myriad of other semi-synthetic, artificial or hybrid replacement parts. Bionic spares already abound.

In Repair, there is body contouring. This elective plastic cosmetic surgery in-

are many shining stars.



Georgia O'Keefe



Jimmy Stewart



Alberta Hunter



Chesley Bonestell

PHOTO COURTESY WNET-TV

cludes face lifts, abdominoplasty ("tummy tuck"), hair transplants, elbow lifts, arm lifts, breast enlargements and reductions, penile implants and more.

Aging as an Idea

"Everyone ought to have something that gets them out of bed. A hobby. A girl..."

—George Burns, 81, actor

Burns' stance in regard to old age is simple yet profound, based on the belief that individual mental attitude far outweighs physical condition in extending one's lifespan. No matter how beautiful or handsome we might be in our youth, we cannot escape the fact that within us all exists a shriveled, wrinkled ancient one that must inevitably emerge to confront the world. Only then, in the hoary winter of our years, will true beauty be revealed; it will be the flawless excellence of mind, tempered by life and nurtured by love to serve us when the facades of youth crumple away like so much cracked and faded celluloid.

Mind is a faculty of the brain, a physiological-intellectual process ceaselessly orchestrating the function of the body, a dynamic interplay between biology and attitude which will determine the ultimate nature of the Graying Earth.

Fear is a great killer of the aged. To lose one's bodily resilience is unfortunate, but to lose one's mental control is tragic. Anyone who has watched it happen to a loved one can only dread the day when his or her turn comes. Yet senility, or dementia, is actually one of the least common diseases of old age.

Aging of the brain is the prime evidence of growing older, but even that symptom is noticeable in relatively few people. A 1979 study by the National Institute on Aging reveals that in tests for logical reasoning, no particular age stood out as a point in which mental processes declined. Only about 10 percent of the population over 65 shows some mental deterioration, such as partial memory loss.

Dementia is a group of illnesses that cause a decline in intellectual function. The National Institute for Mental Health says studies indicate that up to eight percent of the population over 65 may suffer dementia to some degree. Alzheimer's disease, or senile dementia, accounts for 50-75 percent of the dementia cases. A progressive deterioration of brain tissue causes gradual breakdown in intellectual capacities such as short-term memory and abstract thinking. Apathy and personality alteration are also common.

Investigators believe that a quarter of all dementia occur in conjunction with ailments such as thyroid diseases, diabetes and chronic infections. Treatment of other diseases can curb dementia as well. Dementia may also be the result of a neurochemical defect in patients.

Researchers have found evidence that there is an aging control center in the brain which affects various organ systems by sending out electro-chemical "youth signals" via the neural chassis. Aging somehow disrupts this process. Treatment includes psychotherapy, drugs, nutrition and natural substances like sweet almond and thistle, which provide beneficial nutrition to the nervous system and generate positive effects on the optic nerve and spinal column.

King of the mental disorders in older adults is depression. Depression and dementia are often mistaken for each other and may occur together. Pseudo-dementia is a severe but reversible form of depression that can appear identical to senile dementia.

The depressed are often hit with feelings of malaise and loss of appetite. They have trouble sleeping, and they express feelings of guilt and hopelessness. Outpatient treatment of depression is typical, but some patients are hospitalized for treatment with electroshock or drugs.

"It's loss," says *Elders in Rebellion* author Lou Cottin. "When we grow older, our senses, motor responses, attitudes and emotional behavior undergo

changes. We experience visual loss, auditory loss, disorientations. Loss of job, loss of friends, loss of loved ones, loss of meaning to life."

It is at this point that biology gives way to attitude, both individual and collective, in shaping the idea of age. Isaac Asimov contends that the notion of the stagnation or stodginess of age is created by the traditions of a youth-oriented society. As people age they accept the images and roles that society decrees for them, and then find their lives empty and meaningless. The sense of loss weighs heavy, the gloom of depression oozes in and surrounds them and they begin the final countdown years before it's necessary.

The aged themselves are in part responsible for this situation. A 1975 Louis Harris poll of people over age 65 reveals that the elderly share the anti-age biases of the general population. Harris sums it up this way:

"As open-minded, adaptable, bright and alert people, most persons over 65 see themselves as exceptions to the rule. Despite their own positive self appraisals, the older public does not differ much from the younger public in their evaluation of most of their contemporaries. Most people over 65 seem to be saying: 'While I, personally, am very bright and alert, most of my peers simply are not.' "

Despite the pervasiveness of negative stereotyping, the new realities of the Graying Earth are sweeping aside outmoded ways of thinking to make room for an unprecedented future.

Images and Roles

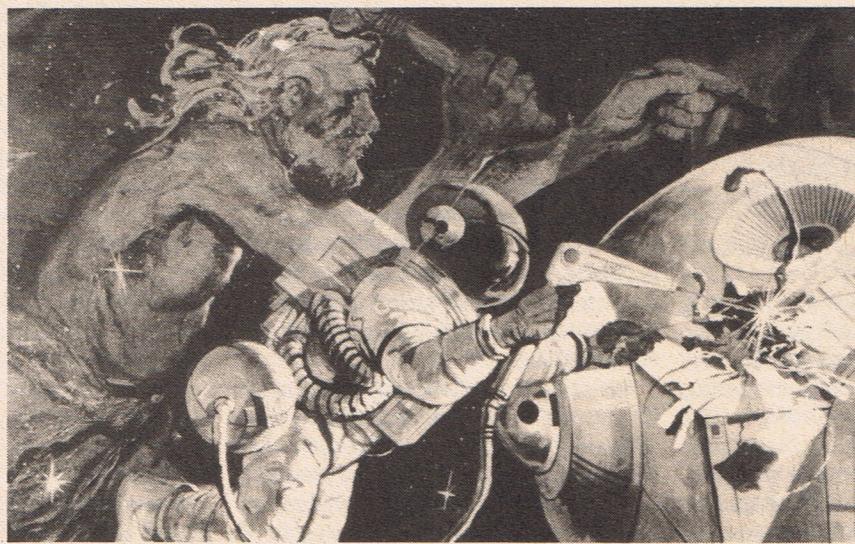
*"...If you are not handsome at twenty,
Not strong at thirty,
Not rich at forty,
Not wise at fifty,
You never will be..."*

—The Annotated Mother Goose

Being old is a new human experience. In America, our over-65 population has grown from three million at the turn of (continued on page 68)

EPCOT

A Proving Ground for the Future



From a concept by Ray Bradbury, "Spaceship Earth" traces the evolution of human communication.

A midterm progress report on "Disney's greatest dream."

By DAVID HUTCHISON

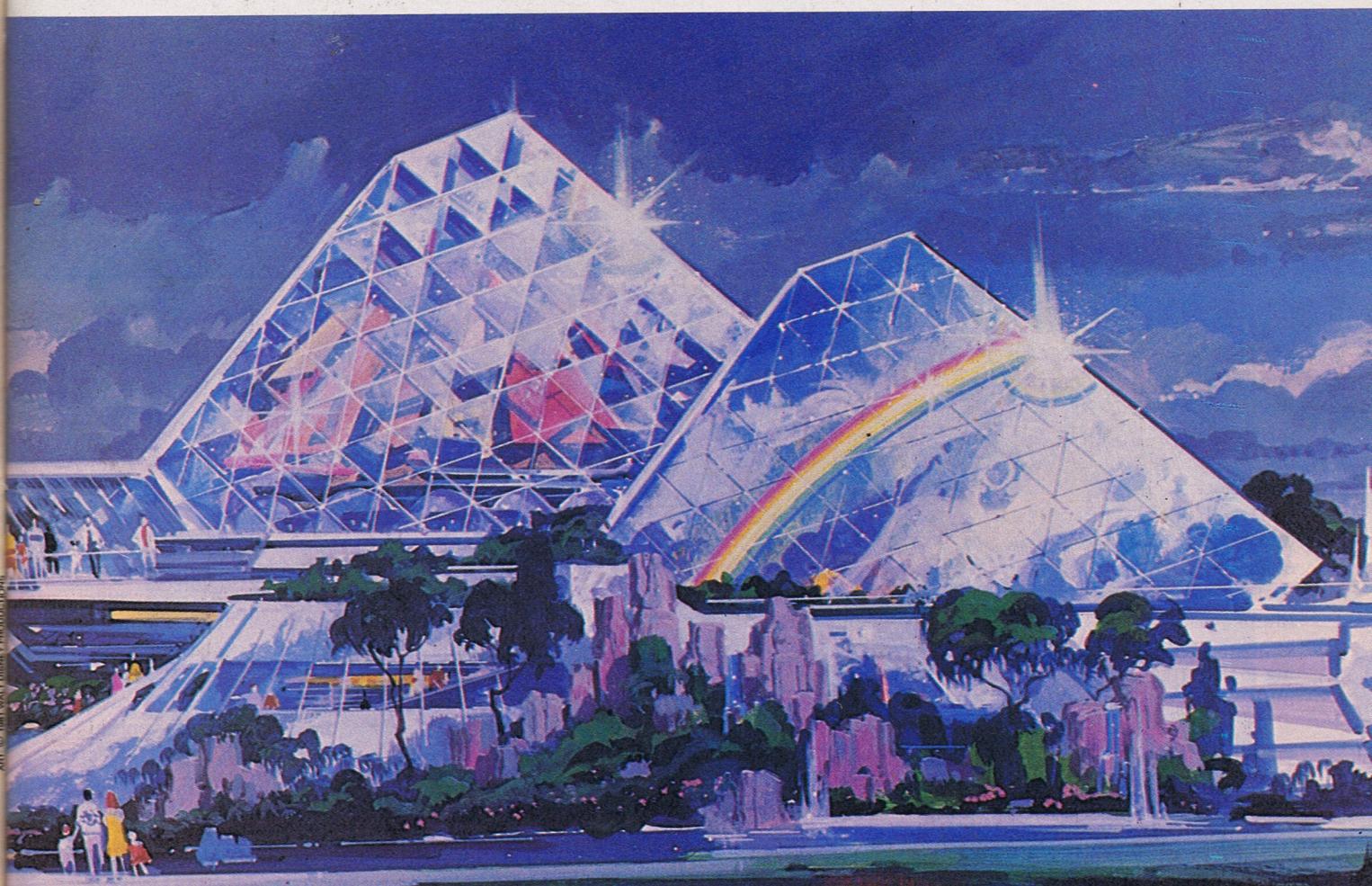
At exactly 9:02 a.m. on October 1, 1982, a gleaming monorail will propel the first visitors from the Walt Disney World Magic Kingdom south about one mile to the EPCOT Center, the latest development of the sprawling 27,500 acre holdings of the Disney empire in central Florida.

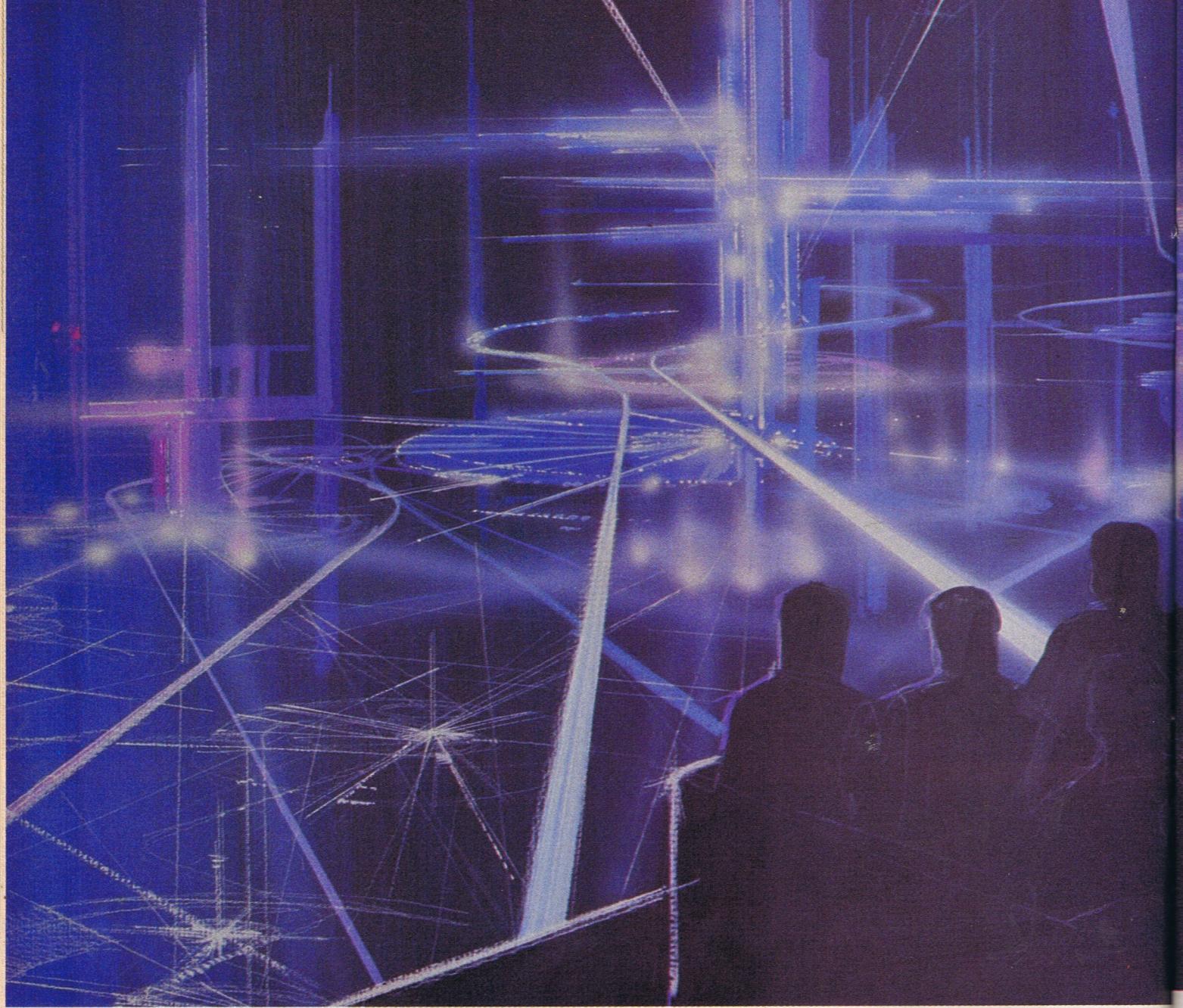
Since FUTURE LIFE's last look at EPCOT ("Imagineering the Future: A Sneak Preview Tour of EPCOT") in March of 1979, public interest, curiosity

and controversy concerning the \$800 million project have increased. Certainly the size and scope of the undertaking as outlined in that article promised that great things would be coming from the Disney organization. Even at this point, with slightly less than two years to go before the first eager crowds board the monorail, that promise shows every sign of being kept.

EPCOT (Experimental Prototype Community of Tomorrow) has been called "Disney's greatest dream." It has undoubtedly proven to be the biggest construction project ever undertaken by a private group in the United States. But it was a multi-million-dollar dream that had very early beginnings. After the now-legendary success of Disneyland in Anaheim and the very visible Disney hand in the design of several pavilions

Top right: Artist's concept for the third portion of the FutureProbe pavilion depicting a possible future environment—an undersea living habitat. Right: An artist's rendering of the exterior crystal pyramids of the Imagination pavilion, sponsored by Kodak.





and rides for the 1964 New York World's Fair, Disney began to push for the next step: EPCOT. In a 1965 promotional film produced shortly before his death, Walt Disney described the direction of the EPCOT project: "EPCOT will take its cue from the new ideas and new technologies that are now emerging from the creative centers of American industry. It will be a community of tomorrow that will never be completed, but will always be introducing and testing and demonstrating new materials and new systems..."

After Disney's death it became apparent to his corporate and artistic heirs that EPCOT was much more than just a "next step"; it was the ultimate long-range goal of a very remarkable visionary.

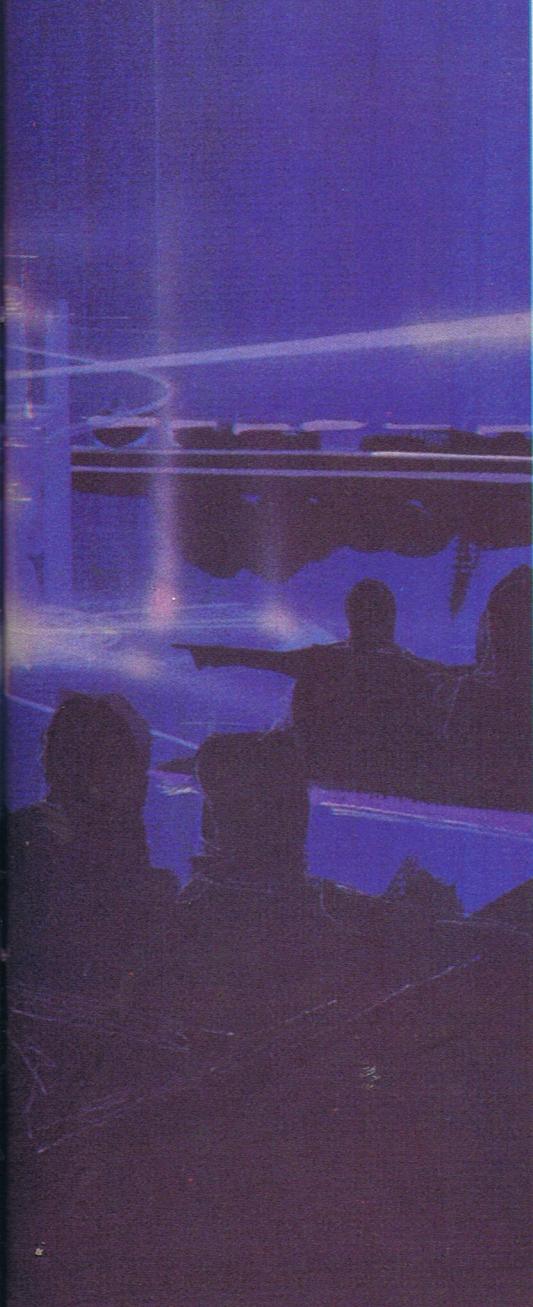
EPCOT, the "community of tomorrow...that will never be finished," entered its planning stages with the Disney imaginers at WED (the design and engineering unit of Walt Disney Productions) in 1975. On-site preparation was begun in 1979 and actual construction started only last year. When this planned first phase of construction is finished in October 1982, a new brand of Disney magic will be born.

In one sense you can think of the pavilions in the EPCOT Center, and Future World in particular, as a new kind of "thrill" ride. But unlike the mere physical thrill of the up, down and around of a roller coaster, EPCOT is designed to thrill a person's most "thrillable" sense—the imagination.

Disney emphasized that "EPCOT

will always be a showcase to the world for the ingenuity and imagination of American free enterprise." Though the Future World theme pavilions—SpaceShip Earth, Energy, Land, Seas, FutureProbe, Imagination and Communicore—will explore the future, they are by no means designed to preach solutions and supply pat answers to the problems of today or even tomorrow. But by suggesting possible alternatives in the most exciting and stimulating manner possible, the designers hope to generate enough excitement in the visitors' own imaginations so that their conceptual horizons will be stretched. EPCOT's Future World becomes a sort of stepping stone or springboard for the imagination.

John Hench, senior vice-president of



"It is difficult to say what is impossible,
for the dream of yesterday is the hope
of today and the reality of tomorrow."

Robert Goddard

Left: Artist's preliminary conception of the beginning of the finale of the ride-through portion of the Transportation pavilion presented by General Motors. This part of the ride-through will lead into an area in which guests will have the opportunity to try out, in simulation, some vehicles of the future.

Right: At the conclusion of the ride-through portion of *The Land*, presented by Kraft, guests will view a working demonstration of some of the most advanced systems in controlled environmental agriculture. Dr. Carl Hodges of the University of Arizona, among other scientists, has developed systems that are on the leading edge of farming technology.

Below: A preliminary concept for Sea Base Alpha, the climax of *The Seas* pavilion which is presented by Disney, is at the bottom of a 5½-million gallon tank—the largest seawater tank ever built. Sea Base Alpha is a futuristic undersea research station nestled in the midst of a living coral reef. Guests will travel through the coral reef in small bubble-shaped observational modules and watch experiments with dolphins and other inhabitants of the reef. They will then be able to visit the Sea Base itself, a community on the ocean floor. The Seas is planned to open, as part of Phase II, in 1983.

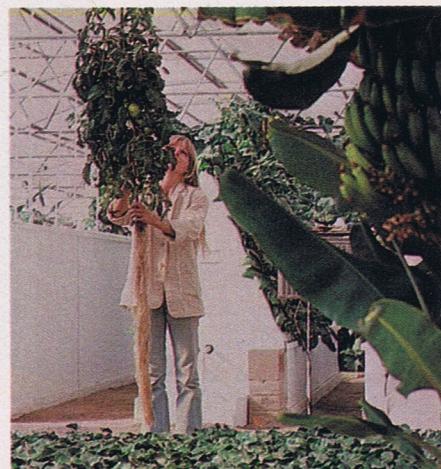
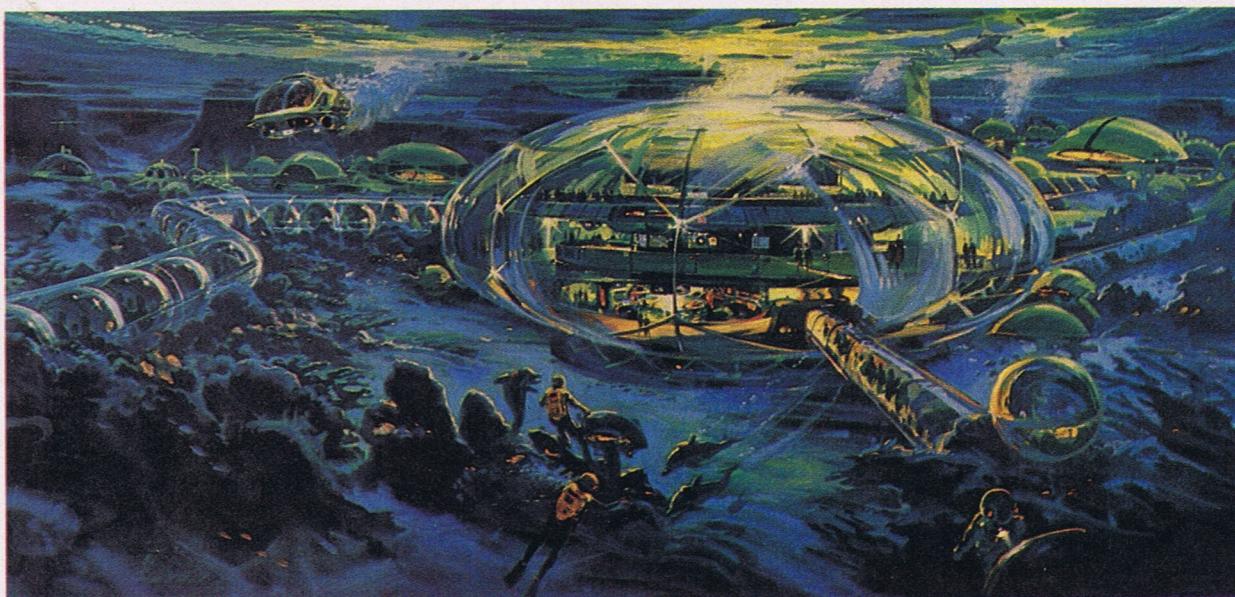
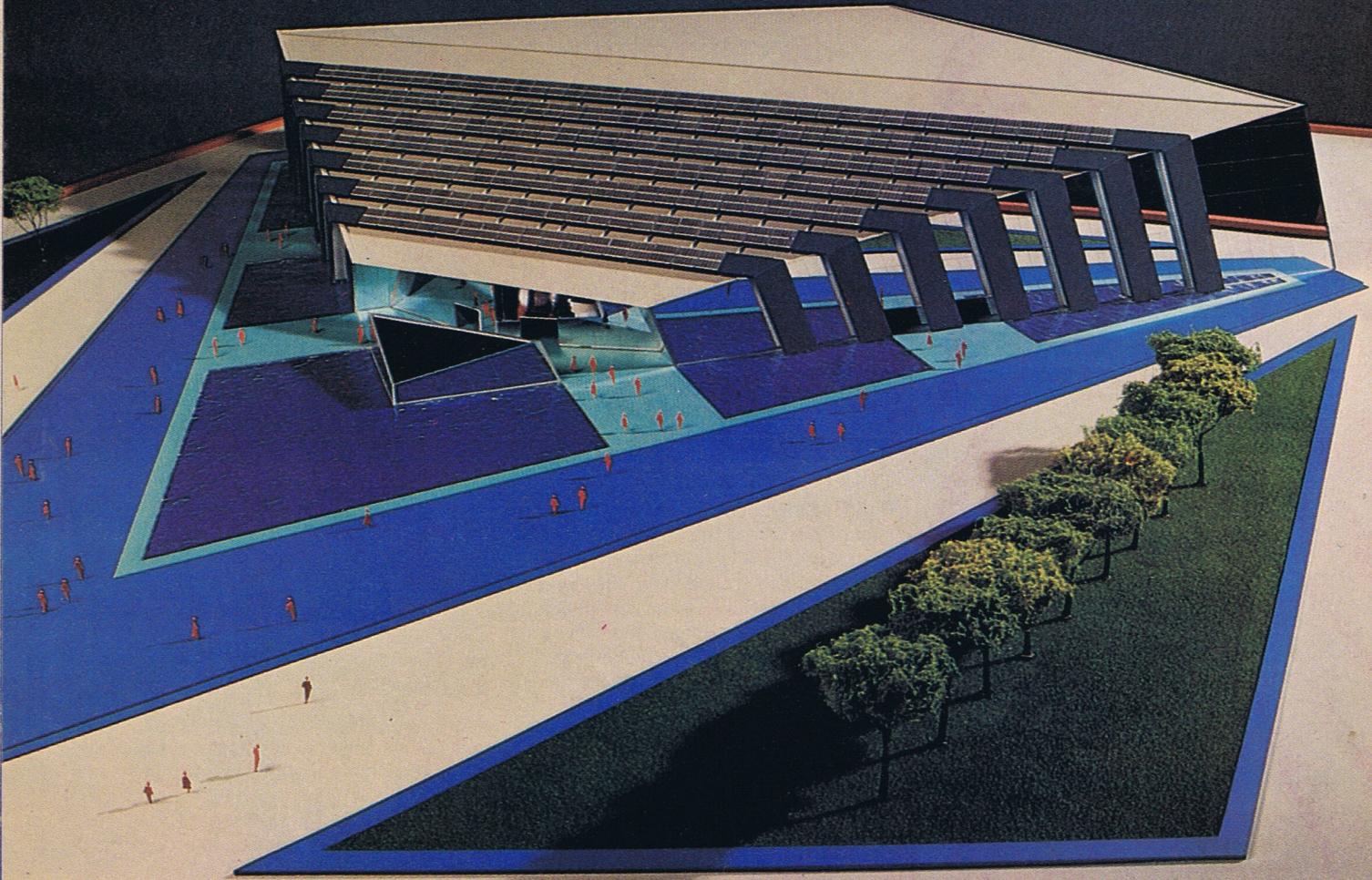


PHOTO © 1980 WALT DISNEY PRODUCTIONS

Here the roots of tomatoes that grow without soil are checked before being sprayed with nutrients. They are grown alongside dwarf banana trees, fed through tubes, and water hyacinths that act as filters and can later be used to produce methane. The EPCOT science advisors and designers hope to dramatically demonstrate some of the most advanced farming systems available today.

ART © 1981 WALT DISNEY PRODUCTIONS





Preliminary model for the Universe of Energy, presented by Exxon. Guests will be riding on "sunshine" with the rooftop photovoltaics.

WED, believes that the central motivating key to EPCOT is survival—human survival—yours and mine. It has been pointed out that the human is unique among Earth's species in that he survives by the superior power of his mind, his power to reason and his imagination; his yearning to know and explore the world and worlds around him is the proper exercise of that facility. Future World and the EPCOT Center want to give that facility a little healthy stimulation.

Another aspect of EPCOT is its use as a testing ground for new technologies and services. This is a step beyond the Magic Kingdom's exploitation of sophisticated technologies as part of its design. Much has been said and written about the Magic Kingdom's new energy systems, vacuum trash systems, advanced central computer systems, fiber optic telephone systems and the use of linear motors in the rides; but EPCOT intends to explore technologies that are only at the research stage or are not yet commercially viable.

These "satellite" demonstration projects will be located throughout the Walt Disney World site and will offer to industry, government, business and aca-

demia a means of testing and demonstrating new systems, technologies and services. Within the 43 square miles controlled by the Disney organization, the EPCOT "Building Code," with the following seven key objectives, establishes the ground rules for the satellite projects and indeed all of Walt Disney World:

- 1) To accomplish coordinated, balanced and harmonious development in accordance with present and future needs.
- 2) To provide the flexibility that will encourage American industry, through free enterprise, to introduce, test and demonstrate new ideas, materials and systems emerging now and in the future from the creative centers of industry.
- 3) To provide an environment that will stimulate the best thinking of industry and the professions in the creative development of new technologies to meet the needs of people, expressed by the experience of those who live and work and visit here.
- 4) To assure the safety, health and general welfare of the District's [as EPCOT is corporately referred to] inhabitants, visitors and premises.
- 5) To establish a sound, safe and forward-looking basis for developing and

maintaining the District and its properties.

6) To provide safety and good practice during construction, alteration, removal or demolition of buildings and structures within the District by establishing uniform, modern and progressive standards, rules and regulations.

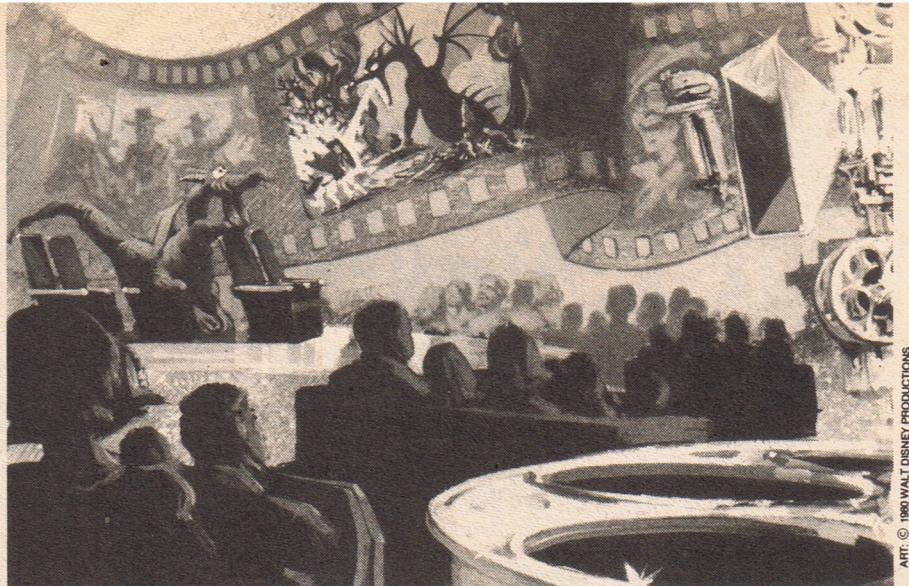
7) To regulate the quality of materials and systems for all buildings and structures within the District, including their design, construction, occupancy, location and maintenance.

With these principles in mind, a number of forward-thinking projects have been built and more are planned.

In November of 1977, Walt Disney World put into operation a two-story office building specifically designed to exploit a unique solar energy concept designed by AAI Corporation of Baltimore. Solar energy powers the building's air conditioning, space heating and hot water supply. It was designed by WED Enterprises and was built with the support of the U.S. Department of Energy.

Devising a system to solve a specific problem in one building is fine, but the WED designers were faced with the

Artist's concept for a sequence in the Journey into Imagination pavilion, presented by Kodak. The show dramatizes the nature of ideas and imagination. The two main characters are Dreamfinder, an affable "professor" type representing the imaginative creations of the past, and Figment, the little dragon-like imp, who symbolizes the youthful creations to come. Here Figment is using his imagination to make new forms of himself, one of which is seen as the "Maleficent" dragon in the film frame. Guests will be treated to a hands-on experience using new technology and gadgets to explore their own creativity and powers of imagination.



problem of designing energy systems to heat and cool all the major EPCOT facilities (two million square feet spread out over 200 acres). WED Enterprises, in conjunction with Reedy Creek Utilities Company, decided that the problem required an over-all systems approach.

By utilizing a central plant for providing hot and chilled water supplies for all pavilion buildings, the most efficient state-of-the-art system was designed. The facility utilizes heat pumps, chilled water storage, waste and heat recovery systems, all controlled by a single computer. This system will permit the extraction of heat from ground water, and will enable the selection of duty cycle operation to match low-rate (nighttime) power periods for cost effectiveness.

Florida's rivers and creeks are often

plagued by large floating mats of water hyacinths. The Disney designers have found a use for these floral "pests." A project was designed to demonstrate the use of water hyacinths as a secondary and tertiary wastewater treatment system. The plants act to purify waste water by absorbing nutrients and filtering solids through their root network. Initially, harvested plants will be composted to provide a soil conditioner. Future activity may include producing methane through anaerobic digestion of the hyacinths. Such a system could dramatically reduce the cost of waste water treatment for small communities as well as produce a soil conditioner and fuel.

In an effort to enhance the demand for electric vehicles, Disney is expanding its use of electric cars, vans and even

pick-up trucks for use in the maintenance organization at Walt Disney World.

These vehicles have a range of about 40 miles per charge and will replace similar internal-combustion engined vehicles in daily operations. Monthly data reports will be made to the Department of Energy and will be used in assessing the economics and technical feasibility of electric vehicles.

The Energy Pavilion will demonstrate a stationary application of this technology, with power transferred without contact only when the vehicles are stopped in the theaters. This is a preliminary step toward an ultimate, dynamic highway system application. WED is working with the General Motors Transportation System Division to achieve this goal.

The key to all of these innovations in Walt Disney World and the EPCOT Center is imagination. The Disney imagineers have used their imaginations to excite visitors with the power and potential that lies within their own minds.

WED's John Hench likes to quote the words of American rocketry pioneer Robert Goddard, who was laughed at only 50 years ago when he proposed traveling to the Moon and planets in rockets. His words have become almost a motto for the WED imagineers: "It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow."



Farm plants growing through styrofoam and without soil at the U. of Arizona.

This is the second in a series of articles concerning Disney's EPCOT Center. The first article appeared in FUTURE LIFE #9. Further articles will discuss the approach and design to the various theme pavilions in Future World and a preview look at World Showcase.

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#1—Godzilla's life on screen; *Galactica's* lost aliens; Tom (*Dawn of the Dead*) Savini; Chris Lee interview; Alex (*The She Creature*) Gordon; *ALIEN*; *Amityville Horror*, *Nightwing* and *Prophecy* previews; Don Maitz FantasticArt; *Godzilla* poster.

#2—Don Coscarelli on *Phantasm*; *Humanoid*, *Dracula* and *Nostromo* reviews; Richard Matheson interview Pt. 1; Making Pal's *War of the Worlds*; Robert Florey's lost Lugosi *Frankenstein*; Ruben Mamoulian on *Jekyll and Hyde*; Prophecy FX; Carl Lundgren FantasticArt; *D*: Who villains and Who poster.

#3—David Cronenberg on *The Brood*; Stephen King on Kubrick and *The Shining*; Matheson Pt. 2; *Kolchak the Night Stalker* article and episode guide; Jack (*It Came from Outer Space*, *The Creature*) Arnold remembers; *Arabian Adventure*; *Tales of the Unexpected* reviews; Mike Sullivan FantasticArt; *ALIEN* poster art by Barclay Shaw.



#4—Aliens of *Star Trek*—The Motion Picture; *Robots of the Black Hole*; Film femme Caroline Munro; Herschell Lewis "The Wizard of Gore"; *Invasion of the Body Snatchers*, *King Kong* and *Curse of the Demon* behind the scenes; On the set of *'Salem's Lot*; Michael Hague FantasticArt; *Warrior Robots* from *Astro Boy* to *Voltus V* plus Robot poster.



#5—Carpenter and Hill on *The Fog*; *Saturn 3*'s SF horror; Bert Gordon's *The Coming*; *Jason of Star Command*'s monsters; *Galactica's* Cylon Secrets; Behind the Scenes of *THEM!*, *Son of Kong* and *Village of the Damned*; Dennis Anderson FantasticArt; Pull-Out Bonus—21" x 32" *Faeries* Posterbook.



#6—*Friday the 13th*!; The shock FX of Tom Savini and Rob Bottin; Peter Medak, director of *The Changeling*; Stephen King meets George Romero; Vincent Price on the *Corman Years*, Pt. 1; *Planet of the Apes*; *Quatermass*; Doug Beekman FantasticArt; *Count Fangor* premiere; Hammer Films history & poster.



#7—*The Shining* preview; Director William Lustig, stars Joe Spinelli and Caroline Munro and FX man Tom Savini on *Maniac*; Inside Bob Short's effects factory and *The Terror Factor*; Chris Walas' alien creations for *Galaxina*; Disney's *Watcher in the Woods* previewed; Vincent Price, Pt. 2; The Hitchcock Legacy, Pt. 1; Hammer's *Captain Kronos* and *Curse of Frankenstein*; and Chuck Jones: The Great American Animator.



#8—We go too far with gut-wrenching pix from *ZOMBIE*; John Carpenter interviewed; Gary Kurtz on *The Empire Strikes Back*; Jim Danforth & David Allen; *The Hearse*; The Monster Maker—Paul Blaisdell, Pt. 1; Scatman Crothers on *The Shining*; Hammer's *Horror of Dracula*; *Force Five* animated preview; and George Pal: Sci-Fi's Best Friend.

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Who Do You Think Created The Chaos?

A surgeon, an engineer and a lawyer were arguing over who had the oldest profession. "God removed Adam's rib to create Eve, so surgery is clearly the world's oldest profession," asserted the doctor.

"But," replied the engineer, "when God created the heavens and Earth out of chaos, that was engineering."

The lawyer looked at the other two smugly and asked, "Who do you think created the chaos?"

As it happens, the first engineer since Herbert Hoover to inhabit the White House has just inflicted four years of chaos on the American space program, so lawyers can't take all the credit. Nevertheless, bad law can make chaos out of our best work. Or, looking at it positively, good law is the cornerstone of all that really matters. How we live and work in space, and even whether we or anyone will ever make their homes there, is critically dependent on the work of a small band of lawyers scattered across the planet.

For example, the rebellion which squashed the 1979 Moon treaty was primarily marshalled by space lawyers Art Dula, J. Henry Glazer and Leigh S. Ratiner.

Houston patent lawyer Art Dula specializes in the laws and regulations that will govern space shuttle payloads. It's his business to make sure that the patents and trade secrets that protect space entrepreneurs' inventions aren't ripped off. He guards the interests of dozens of these inventors, who range from backyard tinkerers to researchers in the laboratories of giant corporations and universities.

Art was the first to warn me about the Moon treaty. It would have enabled any nation on Earth to steal any invention flown to or in orbit about the Moon or other celestial bodies. But thanks to Art's early warning and help in mobilizing anti-treaty forces, inventors can still hope to get rich on the high frontier.

J. Henry Glazer runs a small law school called White's Inn. Accredited by both the California Maritime Academy and England's Queen Elizabeth, White's Inn is the only place on this planet which specializes in training future space freighter captains.

Dr. Glazer believes that the ancient doctrine of the freedom of the seas, if extended to the vastness of space, will become the cornerstone of human liberty off-planet. He fought the Moon treaty because it would have authorized the boarding of space vessels anywhere except in Earth orbit. Can you imagine what would happen if any nation could board our sea-going ships? We fought the war of 1812 over that issue. Remem-

ber which culminated in the sinking of the Spanish Armada.

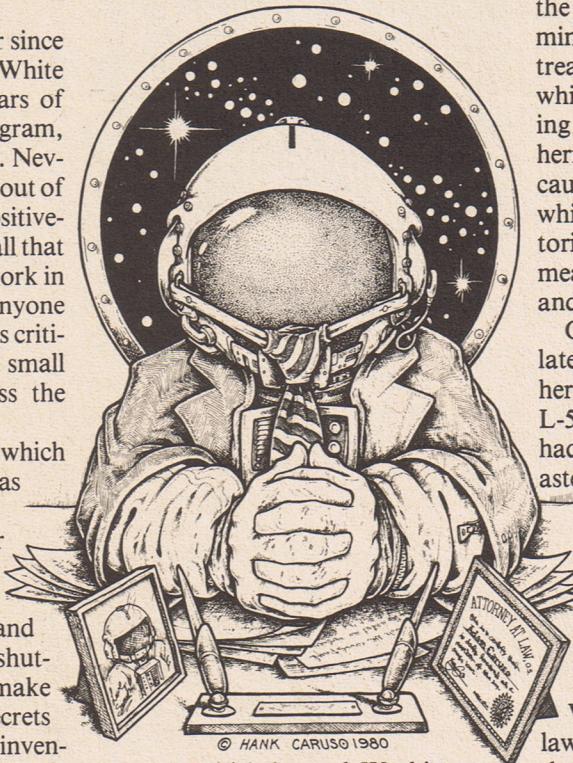
Leigh Ratiner, like Glazer, believes that the law of the sea sets vital precedents for space. He served as Administrator of Ocean Mining under President Ford but quit to become a lobbyist when Carter came in.

I first met Leigh when he and my husband were putting together an article for the *L-5 News* on the parallels between the legal issues of deep sea and asteroid mining. Leigh, in veteran lobbyist style, treated us to a delectable Italian dinner while explaining how the U.S., by agreeing that the seabeds were the "common heritage of all man(sic)kind," had inadvertently accepted a legal doctrine which the U.N. later used to slap a moratorium on all deep sea mining. That meant \$400 million in mining research and development down the drain!

Of course, when that Moon treaty later came out with that same "common heritage" clause, you'd better believe, as L-5 president, I threw everything L-5 had behind the fight. A moratorium on asteroid mining? What's going to happen to my homestead in the sky?

Using Ratiner's talents, L-5's lobbying bill skyrocketed from \$800 to \$10,000 per month—and it was a bargain. We're not going to let any hundred of millions of asteroid research go down the tubes. Where can people go to study space law? Personally, I think White's Inn is the best. Instruction is held over three-hour dinners—a venerable British maritime law school tradition, Dr. Glazer assures me. You can write them at 37 White St., San Francisco, CA 94109. The University of Mississippi, the University of Southern California, the University of Arizona and, over in Montreal, McGill University Law School all have space law programs.

We joke about bad law creating chaos, but it's not all that funny. Carelessly written space law might let us in for conflicts far worse than that which launched the Spanish Armada, or empower a despotism that could encompass the galaxy. The labors of all the scientists, engineers, industrialists and politicians backing space will be successful only if we have good lawyers too. F



ber, the British burned Washington—maybe not such a bad idea.

People have fought and died for the freedom of the seas long before 1812. For example, back in 1493, only one year after Columbus' big discovery, the Pope (that era's equivalent of the United Nations) declared the Papal Line of Demarcation. It divided the Western world, including the Atlantic, in half, divvied between the Portuguese and Spain.

France protested, asserting that, "In lands which the King of Spain did not possess they ought not to be disturbed, nor in their navigation of the seas, nor would they consent to be deprived of the sea or the sky."

England did France one better, with a challenge to Catholicism's naval might

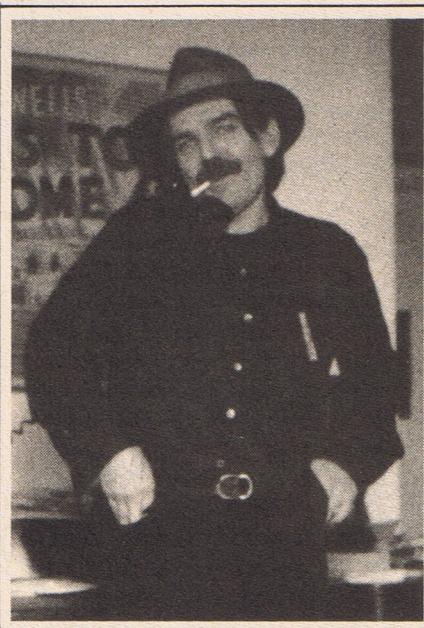
CAPTAIN BEEFHEART

By LOU STATHIS

Should anyone require proof that aliens do indeed walk among us, they need look no further than Don Van Vliet. Under the name Captain Beefheart, the 39-year-old Van Vliet has created over the last two decades what could, in its loosest and most expansive definition, be called rock music—though his particular species resembles no other known terrestrial variety. He is gifted with a fearsomely pyrotechnic brilliance, possessed by an artistic vision of striking singularity and cursed to suffer the frustrations endemic to a callous recording industry.

Captain Beefheart's regal presence was a familiar one on the psychedelic music scene of the '60s (frequently linked with countercultural clown-prince Frank Zappa), and his notoriety as one of the lunatic fringe's more incorrigibly ragged edges was a dubious distinction at best. A naturally flamboyant, exuberant eccentric who had little difficulty securing a place for himself apart from the self-consciously extremist crowd, Beefheart's turn-of-the-decade salvo of classic LPs—*Strictly Personal* (1968), *Trout Mask Replica* (1969), *Lick My Decals Off, Baby* (1970) and *The Spotlight Kid* (1972)—gained him a rabid, fiercely devoted cult following, but little mass-public recognition of the true depth and audacity of his genius (let alone any financial reward). A subsequent trio of albums, rife with corporately imposed commercialisms, stranded a still-penniless Van Vliet in the '70s with an almost totally eroded avant-garde credibility.

Is that the end of our tragic story? No way. In this present era of re-birth (with repetition, perhaps that idea will become fact), it's only appropriate that the new decade's first album by Captain Beefheart and His Magic Band, *Doc at the Radar Station* (Virgin VA 13148, distributed by Atlantic), is not only his best in ten years, but quite possibly his best ever. What this in essence says is two-fold: 1. The world has finally caught up



with the Beefheart vision—where before we were mired in a completely different frame of reference, we are now only a few short steps behind him (in other words, his music suddenly makes sense to us); 2. Van Vliet himself seems to have caught up with his vision. With *Doc at the Radar Station* he has attained a new level of control, taming the raw sonic beauty that sticks from his music like cactus needles without blunting the points or disguising their potential for injury. This album documents the refinement of artistry, without sacrificing the element of risk that keeps that artistry alive. The Captain's 1980 quantum leap is closely akin to the jolt given us by this past year's Voyager close-ups of Jupiter and Saturn; we've always known these objects were beautiful, but suddenly, concretely, we can plainly see just how awesome and magnificent they truly are.

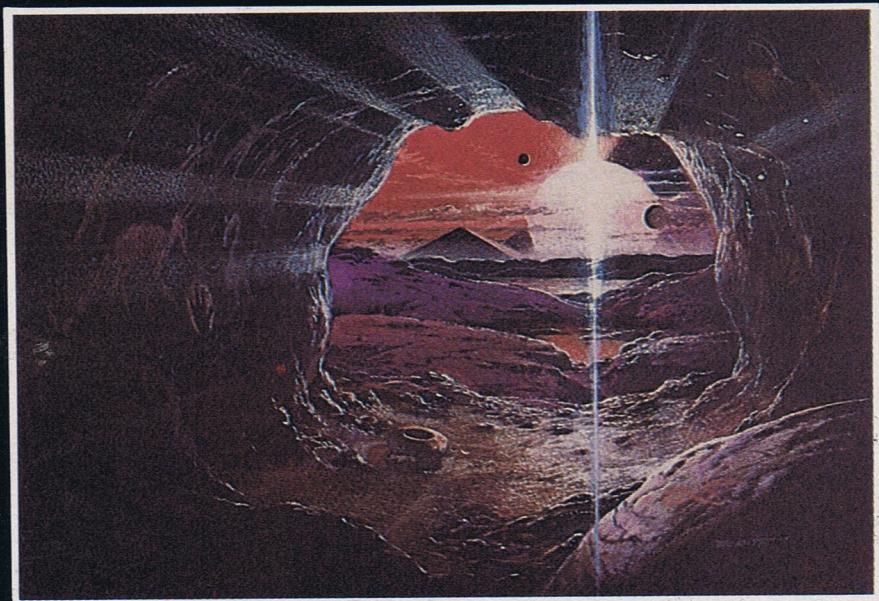
Trying to make sense out of a close encounter with Don Van Vliet is almost as futile as semaphoring a description of his music to a deaf mute. An interviewer gets the distinct feeling that English—or any tongue for that matter—is a second language for Captain Beefheart. His non-stop, free-associational, pun-pregnant word-chains quickly leave the merely human observer in a helpless, bewildered quandry, worried sick that the paltry standard allotment of five senses

is woefully inadequate to handle the complex data signals beamed our way. The Captain is voluble and energetic, but victimized by sudden distractions and a constantly derailing train of thought. ("I can't concentrate," he deadpans, "I'm too smart.") Never before has the mystification and frustration that must accompany contact with the non-human been so readily apparent. Reading science fiction doesn't prepare us for this.

Physically, Don Van Vliet is an unimposing figure. He projects an aura of childlike fragility, of vulnerability, as though the thrusting intrusions of modern life stab at him with a physical, knifelike pain. One is reminded of David Bowie's Newton in *The Man Who Fell to Earth*: an extraterrestrial innocent preyed upon and ultimately defeated by a corrupt humankind. But Don Van Vliet has not been defeated. Behind his animated visage ("I cleansed myself of expression when I was two," he explains, "and it's gotten me into a lot of trouble."), and through the gray-blue liquid warmth of his eyes, flashes the unmistakable gleam of an incisive, impish vitality. Or perhaps, to use one of Beefheart's own metaphors (from *Doc's* "Dirty Blue Gene"), there lurks the "shiny beast of thought," which like another shiny beast—H.R. Giger's alien from the movie of the same title—must survive at all costs.

Talkative as the good Captain might be, he stubbornly resists discussion of the most expected topic: music. At the very mention of the word he shifts into high-gear evasive maneuvers. "I'm no musician," he announces with a self-effacing wave of his hand, "I'm a sculptor." (In fact, at the age of five he was sculpting live on local Los Angeles television.) But despite his apparent disingenuousness, Don isn't fencing us off here with mere verbal parry-and-thrust. He's actually offering a valid insight into his process of musical conceptualization
(continued on page 57)

James A. Bryant



ART © 1981 JAMES A. BRYANT

"I don't do trees very well," admits the space artist with a smile. "I paint rocks."

Actually, Jim Bryant paints a lot more than rocks; and what he does paint, he paints very well. The two works featured in this issue's Gallery are indicative of his realistic, detailed style of outer space artistry.

Raised in the midwest, Bryant is similar to many of his peers in the way that he became interested in space: through comic strips, Flash

Gordon serials, and the like. However, his entry into the world of art was a little more violent than most.

"Believe it or not," he says, "I got into art by being hit by a car. I was seven years old at the time, and I was laid up in the hospital for three months. To amuse myself, I started copying comic strip characters, just to pass the time. So what I'm doing for a living is a hobby that got out of hand."

Now a senior technical artist for Goodyear Aerospace Corporation, Jim Bryant

spends his professional time creating brochures, product illustrations, and public relations promotions. In his spare time, he delves into his imagination and expresses on canvas his sense of the beauty and wonder of other worlds.

He has a tendency not to title his works, preferring that viewers make their own interpretations of what they see. The scene pictured above vaguely shows the evolution of an alien race, from the caves of their early ancestors to the pyramids of a growing

civilization, and beyond. The centerfold doesn't even have that much of a story behind it: it simply was created to show the lovely aesthetics of a reflection in the water.

"I think it's better if the persons looking at the painting gets out of it whatever they get out of it," says Bryant. "I have never had any real psychological feelings about the things that I do. They either entertain the persons looking at them or they don't; but that's their only reason for being." □

Centerspread: "Untitled" © 1981 by James A. Bryant





ROGER ZELAZNY

The popular author of *Lord of Light* talks about his craft.

By W.B. THOMPSON

The name Roger Zelazny is synonymous with excellence in the realm of science fiction writing. At 41, Zelazny finds himself in much the same position as did Alexander of Macedon some 2,000 years ago. A six-time recipient of the genre's most coveted awards—the Hugo and Nebula—Zelazny is left with few worlds to conquer.

But rest assured, he's looking.

Zelazny has published 85 short stories and articles and, to date, 20 novels. His latest full-length work, *Roadmarks*, was published in November. Zelazny's stories have been translated into 13 languages, while his much-heralded novel *Lord of Light* (1967) stands as a model by which others have measured their success.

At the first awards presentation of the Science Fiction Writers of America in 1965, he swept two of the five Nebulas for "He Who Shapes" (Best Novella) and "The Doors of His Face, the Lamps of His Mouth" (Best Novelette).

His famed *Amber* series, beginning with the release in 1970 of *Nine Princes in Amber*, and culminating nine years later in *The Courts of Chaos*, is a collection of five novels that is now under film option. A theatrical version of Zelazny's *Damnation Alley* (1969) was produced in 1977 by 20th Century-Fox.

Cleveland-born Zelazny completed his undergraduate studies at Case Western Reserve before taking a masters in comparative literature at Columbia University. Zelazny, wife Judith and sons Devin Joseph and Jonathan Trent have resided in Santa Fe, N.M., since 1975.

When did you undertake a writing career?

I began writing part-time in February of 1962. I sold my first short piece

around the end of March, about six weeks later. I continued on a part-time basis until 1969, when my earnings from writing equalled my salary from the job I was holding (with the Social Security Administration). At that point I quit to write full-time.

Religious themes have played an integral role in much of your writing. Still, one can detect a conflict of influences, something of a battle between piety and reasoned agnosticism. Is there anything to this observation?

That's hard to say. When I began writing I used a lot of religious and mythological material. I did this intentionally because this was a body of information that I just happened to possess. For a time it had me labeled as a writer of mythological science fiction. I was in the process of filling in my background in a number of other areas that I intended to use in later books. Eventually I wanted to get away from the label. So I wrote other things, like *Doorways in the Sand* (1969), which is considered pure science fiction.

Does that novel hold special significance for you?

I'm very fond of the book. It's one of my two or three favorites. It came very close to being what I wanted. I was trying a little something experimental, using flashbacks as a device to tell the story. It was a departure from my early work inasmuch as it contained nothing of a mythological nature. All things considered, I was quite pleased with the way it turned out.

In many respects it also might be called your most humorous book. Why?

Yes, humor was another thing I was trying for. I had wanted to write something humorous for some time and was waiting for the right situation. An

added plus was that I wound up liking the character myself.

Unlike many other writers, you've not felt it absolutely necessary to afford detailed scientific explanations for inventions of the mind. Do you have a particular reason for this approach?

Nowhere in the *Koran* does Mohammed mention camels. Everybody knew what a camel was. There are any number of writers whose approach does not really involve science that much. On the other hand, if I do want a piece of scientific information I like to know where to get it. I set up a reading program for myself about eight years ago and read some 500 books on the general sciences. I do keep up with them. But how much of that I use in my stories is a very moot point.

Readers and critics often are disposed to pinning down an author to a single underlying point of view, one that ties together each of the writer's works. Have you found this to be the case with your stories?

I feel I've escaped that for the most part. A person changes over the years. And I'd hate to think that I'm static and unchanging. My attitudes do evolve. Also, I would hate to be categorized. I vary my approaches and the nature of the subject matter. There are so many things in the world worth writing about that it's sort of silly to restrict yourself to one narrow area.

Many of your lead characters are to some extent outside the law, or are shielded from the various social conventions and pressures. Characters like Francis Sandow, Corwin and Fred Cassidy also seem to have a great deal of personal freedom. Is this an everyman's fantasy, or is it a facet of your personality showing through?



Well, Thomas Wolfe said anything a person writes is to some degree autobiographical. I suppose this same feeling of personal freedom is what I was aiming for in hoping one day to be a self-employed, full-time writer. I didn't want to be bound so much. I wanted to have more time on my hands and not have to take or give orders. So it might have carried over into the books. I suppose there's a little bit of me in all of my characters, but there's no particular one that I identify with. I do try to keep myself out of the things I write, at least to the extent of not using any character as a personal spokesman.

When did you first become fascinated with science fiction?

It was a childhood addiction. Part of my experience is that once a person starts to read science fiction he reads backwards in time as well as forward. I started reading in the field when I was about 11 years old. In those days you could go to the Salvation Army store and get a box of old pulp magazines for next to nothing. That was where it was

born. I wanted to write ever since I was a kid. It was something I always felt I would do one day. So I sort of directed myself toward setting up a situation where I could write full-time.

Two of your most honored short pieces, "A Rose for Ecclesiastes" and "The Doors of His Face, The Lamps of His Mouth," were something of a throwback to science fiction's golden era of the '30s and '40s. You had to wage war with the technological explosion in those instances, didn't you?

Yes. Those two stories were a tribute to the older genre of writing, the Edgar Rice Burroughs sort of thing. Considering they dealt with Mars and Venus, I just got them in under the wire. At the time they were written I was aware of the Mariner flights and fly-bys that showed the planets weren't the way I was describing them. But general knowledge hadn't penetrated to the extent that I couldn't get away with it.

If someone was to hold up an individual work of yours and proclaim it the quintessence of Roger Zelazny, which

one do you wish he'd choose?

Oh, I suppose it would have to be *Lord of Light*. It took one year to the day to complete. I was working 40 hours a week at a job and writing on the side in the evenings and on weekends. I've taken longer between starting a book and finishing it, but those were cases in which I'd stopped writing to do something else. I was working on *Lord of Light* continuously.

Within the science fiction genre, which authors have most influenced you?

If I had to name anyone in particular it would be Stanley Weinbaum and Henry Kuttner.

What of contemporary writers?

Among those writing right now, I enjoy reading J.P. Donnelly quite a bit. And the Canadian novelist Robertson Davies is very pleasant to read.

When do you write? At what time of day and under what conditions?

I hit the typewriter about four times a day just for brief periods. If I don't feel like writing more than three sentences I stop. I'll write those three sentences though. If I do feel like writing I'll keep going as long as the mood holds. I have a soundproof office out of the traffic stream at the house. I've found that I tend to do my best writing at night. There seem to be day people and night people.

Is there a fundamental difference in the way you attack the writing of a short story as opposed to a novel?

Yes, there's a pretty big difference in my case. A short story idea usually just comes to me and I simply sit down and write it. With a novel, I have an idea of the main character first, before the storyline. Usually I'll work with the main character, visualizing certain situations in which he might find himself. I consider what sort of person he's like and in general how he'll behave. Normally I'll take a couple of those situations and work out a way to get the character from the first to the next. Then I fill in the background of the secondary characters. Quite often a minor character takes off and becomes a major one. I just follow that progression of situation to situation and gradually it falls into place. In other words, a short story is conscious fodder, a novel is unconscious fodder.

How much emphasis do you place on style or elements of structure such as pace?

Consciously I don't think about pace

that much anymore. When I was beginning to write longer pieces I used to go back and reread as I was writing. I found I had a tendency to summarize what turned out to be key scenes. I discovered that any time action occurred there was a pace problem. So I cultivated a mental slow-motion effect. After it had grown cold, it was all right. I had a tendency to contract things at first and I had to learn to expand them.

Of all your creations, perhaps none is more intriguing than the concept of the "trumps" in the *Amber* series. Did you start out with the idea of using them as a vehicle for the internecine warfare between the characters or more as an allusion to interdimensional travel?

To be honest, the idea of the trumps started out simply as a means of describing a large number of characters in a hurry. I had all these brothers and sisters in the first book. If I had to describe each one of them as they were being introduced it would have amounted to an awful lot of unwieldy description. No one would remember who was who. So I knew it would have to be something like a gallery. I managed to describe each one in a few pages, however. Thus, anytime I introduced them, if the reader wanted, he could flip back and see what they looked like.

Amber has been your first and only series. Is there a reason for this?

I'm a bit leery of doing them. I think you're cheating if you do one of these interminable series where you never wind up anything. I wanted to conclude the action that started in the first book by the end of the fifth. If I every did want to go back and use, say, a different character in the whole family setup, it would not be a continuation. Rather, it would be a separate story.

Do inequalities in financial reward and artistic recognition between SF and mainstream writers still persist?

That picture has improved considerably just in the last few years. But looking at it from a mainstream critic's or reviewer's standpoint, I suppose much of the problem was a carryover from the stigma of the old pulp magazines. This idea has been partially eradicated over the past decade.

When a novel can command a pre-publication sum of \$100,000, as Joe Haldeman's *Mindbridge* did in 1976, can the science fiction collective start celebrating?

That was a milestone, no doubt. But the intellectual treatment of the genre

can be seen in many areas now. There are a couple of thousand science fiction courses being taught in colleges around the country. Not all of the professors are professional writers, but two who come to mind which are in that category are James Gunn at the University of Kansas and Jack Williamson here in New Mexico. Also, there's the Modern Language Association which has set up special Science Fiction Research Association studies and a periodical, *Extrapolation*.

Is it possible that the often sophomoric nature of certain comic book-like science fiction films might subvert this intellectual growth?

It's too early to say. I suppose we'll have to wait and see. There's always a segment of the public that embraces such fare.

Is the picture a bright one for aspiring science fiction and fantasy writers?

I'd say so. It's a buyer's market and now is a good time for someone to try his hand. But I would counsel any beginning writer who wants to get his feet wet to start with short stories. When I started out I made a list of all the magazines in the business and I would write a story and send it to the first one on my list. In the meantime, I'd be working on another story. If that one came back, I'd send the story I'd just completed to the first magazine, and so on. I tried to keep 10 stories circulating at all times. Thus, I had to write several stories a week.

Your collaboration with artist Gray Morrow on *The Illustrated Roger Zelazny* was an unusual and highly interesting experiment. Were you pleased with the end result?

Yes I was. I enjoyed doing it simply because it was something I'd never done before. Gray's companion art portrayed my stories just about as accurately as another person can see what is in your mind. The thing that impressed me was that Gray changed his style to suit the story and used a variety of techniques. It was particularly interesting and fun working with him on the Jack of Shadows story he wanted to do.

There has been less pleasing results, however. The film version of *Damnation Alley*, for instance, comes to mind.

Yes, I was a little dismayed by it. Obviously, I had nothing to do with the production. I had read an early script which actually was quite good. I thought that was the script they were going to shoot from. Initially the script was done by Lukas Heller [*Hush, Hush Sweet Charlotte*, *The Dirty Dozen*]. He did the

script that I read and liked. The studio wasn't completely happy about it, though, and they gave it to another writer. It got revised beyond recognition from my standpoint.

Would that make you think twice about trying it again?

No, I'd do it again. I have a product that I sell. I would prefer that they do a good job. On the other hand, I took their money and I'd do it again. I would hope for a better product later on, but I'm in business to sell what I write. The way I look at it, if they make a bad movie based on something I've written it's eventually going to be relegated to the late show and will be forgotten, whereas the book still will be around. Strangely enough, the book was reissued with an illustration from the movie on the cover at the time the film came out. The editor went through a couple of thousand shots to find something that looked like it remotely represented something in the book. But it sold amazingly well for about a year after that. There is a publishing theory that says people who purchase hardcover books think about it a bit in advance, whereas paperback purchasers are impulse buyers and tend to be influenced by whether or not a book has been made into a movie.

Other than reading, conversing and daydreaming, what do you do for relaxation and, by extension, inspiration?

I listen to a great variety of music. But I don't listen while writing. If I run into a particularly difficult problem, I'll play a piece of folk music. I like jazz and classical, too, but folk music offers just enough distraction. Often a writer needs a certain level of distraction to let the subconscious push up the images and information he needs.

Now that *Roadmarks* is behind you, what's next on the agenda?

I have a great number of ideas, but no particular emphasis at the moment. For a book, I don't like to plan more than one ahead. That's because my tastes may change in the course of one book. I simply file the ideas away in the back of my mind.

Is there a single quality without which a work cannot be considered good science fiction?

I hate to be trite, but I have to use the old cliche of it having to have a sense of wonder. If a piece has that, it gives me pause. I take a deep breath and say, "That's a mind panorama, a neat concept, or awfully well done." That's what it takes.

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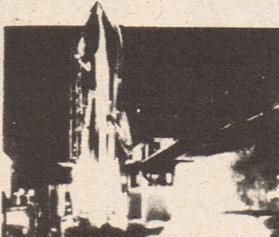
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B/W—Starring: Jeff Morrow, Barbara Lawrence, John Emery, Morris Ankrum. A flying saucer crashes into the ocean, and a giant robot, capable of draining all Earth's energy, emerges. Atomic bombs are useless as it approaches L.A.



"INVADERS FROM MARS"

Color—Starring: Arthur Franz, Helena Carter, Jimmy Hunt, Morris Ankrum. Young boy is unable to convince townspeople he has seen flying saucer land in backyard. One by one, his parents and others are "taken over" by invading aliens. Classic cult movie directed by William Cameron Menzies.



"TALES OF TOMORROW"

Vol. 1 (3 episodes)

B/W—This classic SF anthology series was produced live from 1951 to '53 by George Foley with top-name writers and actors. Includes: "Frankenstein," starring Lon Chaney Jr.; "Read to Me Herr Doktor," a robot tale starring Mercedes McCambridge; "Tomb of King Tarus," a 4,000-year-old mummy, starring Walter Abel. (Includes commercials & trailers.)



"FLIGHT TO MARS"

Color—Starring: Cameron Mitchell, Marguerite Chapman, Arthur Franz. An expedition crashlands on the red planet and discovers an advanced underground civilization. Beautiful special effects, matte work! Produced by Walter Misch.



"THE FLYING SAUCER"

B/W—Starring: Mikel Conrad, Pat Garrison, Hanz Von Teuffen, Virginia Hewett. A huge saucer, hidden under a glacier, is the subject of search by U.S. and Russian scientists. This was the first film dealing with flying saucers and was reviewed by FBI before they allowed its release.



"THE CRAWLING EYE"

B/W—Starring: Forrest Tucker, Janet Monroe, Jennifer Jayne. A chilling SF terror tale of a shimmering alpine fog that contains deadly creatures from another planet. Victims are found decapitated; tremendous tension! Released in England as "The Trollenberg Terror," with music by Stanley Black.



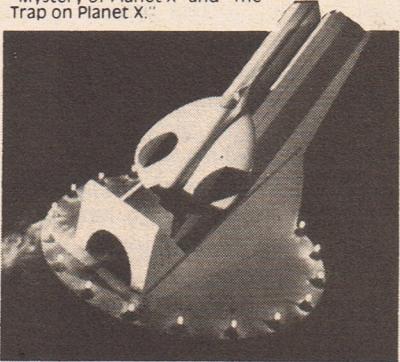
"STRANGER FROM VENUS"

B/W—Starring: Patricia Neal, Helmut Dantine, Derek Bond. A benevolent (but frightening) being from space lands to warn Earth and pave the way for arrival of "mother ship." Never released theatrically in U.S., this is essential! "The Day the Earth Stood Still" redressed. Historically fascinating!



"SPACE PATROL" Vol. 1 (3 episodes)

B/W—Starring Ed Kemmer as Buzz Corry & Lynn Osborn as Cadet Happy, with guest stars. Set in the distant future, this sensational adventure series was one of the longest running and most popular of early TV, with the Space Patrol braving weekly dangers ("live" from Los Angeles) to keep interplanetary peace. Included: Early 15-minute episode, prior to Buzz Corry's emergence, plus two 30-minute episodes with commercials, "Mystery of Planet X" and "The Trap on Planet X."



"TOM CORBETT—SPACE CADET" Vol. 1 (3 episodes)

B/W—Starring Frankie Thomas as Tom, this series became gigantically popular in early 50s, playing on four major TV networks, with a radio version, a comic strip and numerous merchandising tie-ins. Based on Robert Heinlein's book *Space Cadet*, the series had rocket expert Willy Ley as tech advisor. Includes: "Ace of the Space Lanes" & "The Martian Revolt," plus premiere 15-minute episode, "At Space Academy." (Commercials & Trailers)

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On the stress-laden set of *Altered States*, love meant never having to say "You're fired."

By ED NAHA

Beneath all the special effects," says actress Blair Brown, "Altered States is a story about a relationship between two people. A relationship that is subjected to a lot of... stress." The female star of Ken Russell's newest and most visually striking film emits a sly giggle, realizing that she may have just uttered the understatement of the year.

Stress may indeed be the key word in describing the making of *Altered States*. Onscreen, scientist Edward Jessup (William Hurt) allows himself to become the victim of uncontrollable physical changes while seeking a genetic link between contemporary humanity and its neolithic ancestry. Offscreen, the cast and crew went through almost as many drastic changes in their two-year battle to bring Paddy Chayefsky's controversial novel to movie audiences; a battle which saw directors, special-effects technicians and visual approaches come and go on a revolving door basis.

The long process of launching *Altered States* started more than 30 months ago with the publication of Chayefsky's novel of the same name. Briefly, the novel told of scientist Jessup's obsession with finding a physical key in modern man which would allow his primitive genetic memories to be uncovered. Through a process combining hallucinogenic drugs with the frequent use of isolation tanks, Jessup unlocks the past; sending his body on a phantasmagoric odyssey through spasmodic physical changes.

Columbia Pictures thought the story a screen natural. Producer Howard Gottfried got together with Chayefsky, the latter agreeing to do the screenplay. Arthur Penn joined the team as director. John (*Star Wars*) Dykstra was taken on as special effects maven. Joe (*Star Trek*) Alves was hired as art director. Veteran

makeup master Dick (*The Exorcist*, *Taxi Driver*) Smith was tapped to handle the intricate makeup effects.

The creative team divided the film into two areas: the normal and the abnormal. The first part of the film would consist of the actors interacting in tense but realistic situations. The second part would deal with the visualization of Jessup's experiments. Jessup's transformation scenes boiled down to three major climaxes: an isolation tank room explosion wherein he would metamorphose into various forms before being rescued from a swirling whirlpool by his frightened wife; a "throwback" sequence wherein he would emerge from the tank in the form of a small, primitive ape-man; and the finale wherein both he and his wife Emily would burn with the fury of unchecked cosmic energy.

It was decided, at that point, that the tank room scene would be handled optically and the other transformations would be represented through the work of Dick Smith's makeup. "In the case of the apeman," reflects Smith, "it was to be a rather simple, straightforward job. For the bodily transformations, however, we had to come up with skin-tight rubber suits which we could inflate with air to slowly change their shapes realistically. It was tricky assignment. The key word had to be realism."

While the technical aspects of the film were being ironed out, director Penn began searching for actors. Eventually, four young faces were picked for the leads. William Hurt was cast as the brooding Jessup. Blair Brown was to portray Emily, his anthropologist wife. Charles Haid was to be Mason Parish, the fundamentally skeptical head of Harvard's endocrinology department, and Bob Balaban was cast as Arthur Rosenberg, a technician who is both amazed and horrified by Jessup's success.

"Casting took quite a long time, at least for me," offers Brown. "Arthur Penn auditioned people very thoroughly. I was there so much, I felt like I was doing a one-woman show of Emily. All of us wanted the picture, though, no matter how hard it was in the beginning. I don't think I ever worked so hard in my life. It was interesting to have a script that you needed a dictionary to figure out. That never happens. It was wonderful to have puzzles to figure out and to have to work to understand your character. We all read vast amounts of scientific material. I read about anthropology and took classes at Columbia to familiarize myself with Emily's world."

Once the actors were cast, all hell broke loose behind the scenes. "We never could decide on a singular ap-



Brown in rubber suit: "Gruesome to shoot."

PHOTO: MORGAN RENARD © 1981 WARNER BROS. INC.



PHOTO: MORGAN RENARD © 1981 WARNER BROS. INC.

In the explosive, fiery finale of *Altered States*, a cosmicly glowing Emily reaches out for her similarly transforming husband.

proach," says Dick Smith. "We would have regular meetings which would cancel each other out. At the end of the fall of 1978, John Dykstra still hadn't come up with anything that anyone was thrilled with. Time was running out. The schedule called for us to start filming around January. Obviously we were way behind.

"I don't know what went on, but the powers-that-be felt that Arthur was somewhat derelict in his duties in that he hadn't been staying on top of Dykstra's work. The movie was beginning to cost a hell of a lot of money and they held Arthur responsible. They let Arthur go. They let Dykstra go. Joe Alves was more than happy to walk away from it. They now felt that they would avoid a big special-effects "name" and just go to whatever optical house was appropriate for the effects. They thought that would be cheaper. I was one of the few people still retained."

Suddenly, the actors found themselves in a movie that was leaderless. "That was probably the most painful

period of time," reveals Charles Haid. "This was the first big film for most of us and to have this great opportunity and watch it get delayed, put off, time after time... You'd lose another job while waiting for this movie to begin."

At that point, Ken Russell was brought in. However, Columbia, reviewing their budget, unexpectedly dropped the project. Warner Brothers eventually stepped in to save the day and *Altered States* struggled to its feet once again.

"We all panicked when Arthur left," says Brown. "One reason was that we all loved Arthur a lot. Another was that we all feared we'd be fired by the new director. The parts meant so much to Bill and me that we almost became ill."

"Yet, in spite of our fear, we were excited about Ken's appearance. It may be an awful thing to say, but there are only a handful of directors in the world who are interesting and Ken is certainly one of them. He takes cinematic chances. He has a vision. He is not literal-minded. I'm so tired of films about little, intimate

relationships. For that, you live; you don't buy a ticket to watch it. Movies are entertainment. They're supposed to take you somewhere else."

Russell's main goal, at the beginning, was to take the film in front of a camera. He began shooting the "straight" scenes while still trying to organize the special effects. Priorities were changed. The exploding tank room scene would go through several gestations before winding up largely as a showcase for the makeup work of Dick Smith. The climactic cosmic-energy portion of the film would wind up being Smith's suits with a computer-enhanced optical overlay concocted by electronics whiz Bran Ferren (see FUTURE LIFE #24).

For a time, confusion reigned supreme. "Things were constantly changing while we worked," remembers Haid. "It was almost a trial-and-error method. We used to see things on the set and we had no idea what the heck they were. We'd see footage of flying mushrooms shooting sparks. We'd have machines blowing sand all over the place.



The darkness of the isolation tank becomes Dr. Jessup's genetic time machine as his body takes its metamorphic journey.

They'd have endless variations of the tank room scene with various figures coming out of the tank; one day it would be Bill in a suit, the next day an inflatable figure. One wouldn't work; another was tried—and another.

"We all had faith in the special effects guys. We knew they wouldn't allow it to look silly in the finished film. We also knew that it wouldn't just be a special effects film. The movie needed actors. It wasn't going to be just a series of pans on interesting objects like *Star Trek*. They worked and we worked. It was grueling. I worked on the picture for over seven and a half months. I was involved with it for over a year.

"It was painful for everyone in terms of man hours. I obviously didn't have to work as hard as Bill and Blair, since they were the ones involved with the effects, but Russell was a very hard taskmaster with us all. He is a brilliant artist, capable of great work. He expected a lot from us. There was a certain determination among the entire cast and crew. We didn't know exactly what we were doing all the time but we knew that we had to give everything we had. This movie was damned special somehow."

Dick Smith chuckles, recalling the prolonged creative process involved at this stage of the picture. "It was a madhouse. Nothing stayed the same for more than a day or so. During the tank room whirlpool scene we were going to have Bill Hurt emerge from the water in series of three of my rubber suits. I had to fly him up to my house in New York where I was constructing the suits so I could sit him in my bathtub while he

wore the prototypes and make sure that he wouldn't bob up and down like a cork in the finished film.

"At one point, they were thinking of filling the tank room with this thick gloopy stuff instead of water. They bought this tankful of goop which was basically K-Y jelly, the stuff that doctors use when they're doing a little exploratory work. When I heard this, I was horrified. How the hell was Bill going to stand up in a tankful of K-Y jelly? Fortunately, they spilled a little outside of the Burbank studio when they were unloading it. People were falling down all day in front of the entrance. Obviously, they learned their lesson and soon we were back to using good old water."

The exploding tank room scene, replete with a full-scale whirlpool, proved a harrowing experience for all involved. "The physical pain involved in that explosion hurt," says Charles Haid. "We had to shoot a sequence where the tank explodes and I drag Blair out of the room into a hallway over and over again. I was always afraid that I would trip and hurt her. It was a physically exhausting picture because the mayhem had to be repeated constantly. We worked on the tank room scene one day for 12 hours!"

Blair Brown, who has to charge through the room-sized whirlpool, also found conditions less than ideal. "It was truly frightening," she states. "I thought I was going to get sucked down into that thing...no doubt about it. My big fear in life is drowning. In a perverse way, that scene was a lot of fun because it was like doing something you wanted

to do when you were a child. That's what acting should be all about, anyhow, being in a larger-than-life environment. In a way, *Altered States* was like a tiring Disneyland."

Principal photography dragged on for months, taking the actors precariously close to a physical breakdown. "Once you got on the set," recounts Haid, "you could never relax. The film was always with you. You were always in the midst of this hyper world of Jessup and Mason and Emily. You were always involved in a scene that had some sort of emotionally draining experience in it.

"There's one point where we bring Jessup back to Emily's apartment after an accident and put him on the bed. Emily and I have this emotional confrontation about Jessup's experiments. Well, the preparation for that scene was so intense that, by the time we filmed it, we were acting as if it had really happened. We slipped into the roles so easily, the characters were almost a part of us. I'm not sure why. Maybe it was the months of work catching up with us. The more we shot, the wilder we got.

"Bill Hurt is a very smart and very sensitive fellow. This movie drained him. He almost became Jessup. He was so exhausted, he was depressed."

"By the time we finished the final transformation scene," echoes Brown, "we were in agony. We were all very distraught. Movies, more so than plays, seep into your life. You don't finish the film off every day. You're in the same state of mind for days and days, weeks and weeks. You can't toss it off. By the end of this film, we wanted to cry."

The film's climax proved the most troublesome to Brown and Hurt. In it, Jessup evolves into a glowing, cosmic being, accidentally sending his wife hurtling into the same state of existence. Writhing in pain, they slowly attempt to reverse the process.

"That was gruesome to shoot," Brown blurts. "We had to wear skin-tight rubber suits. I had two, one called Burnt Brown, the other Rare Blair. They were having problems on that scene because, since my body is supposedly on fire, I should be thinner with my skin gone. Because of the rubber suits, however, I was a little fatter. So Bran Ferren was having a lot of trouble trying to figure out optical effects. We did days and days of tests, with Bran throwing metallic dust on me. They dunked me. They dragged me around. I felt like a rag doll."

"The experience with the suits was horrible. I'm not claustrophobic, but to have something glued all over your body; over your face, hands, the soles of your feet.... At one point, I had small lightbulbs attached to my eyelids and false eyes glued over them. I had a harness attached to my back and I was yanked down the length of a hall. The only things I had exposed of me were my nostrils. I could breathe and that was it. I couldn't see. I would be yanked into this door over and over again, blind. After a while, your body takes a defensive attitude and goes into a dead zone. You slow your metabolism down so much that you're bordering on coma. It's a horrible feeling."

"When we were in these suits, Bill and I couldn't sit. We'd have to lean back on slant boards between shots. They were used back in the days when movies like *Gone with the Wind* were filmed and actresses were uncomfortable in their big skirts. We'd be leaning there, unable to see, and people would come up to us and tell jokes. After a while, though, it got to be like a confessional. You couldn't see the people talking to you and they'd start to tell you very interesting stories. It was a bit like being a priest... which was the only fun part of the deal."

Aside from the physical terrors involved, personality problems were causing a few problems on the set. Russell's visual interpretations of Chayefsky's script were causing the author much angst; eventually leading to his leaving the set by mutual consent and insisting that his name be removed from all credits. (It has since been reinstated, naming him as the author of the novel.)

The actors, however, insist that everything worked out for the best and that

even the personality clash was turned into a plus. "They were very good about not bringing that onto the set," remarks Brown. "We were like children whose parents are getting divorced. We knew something was going on but we didn't dare ask what."

"I think the final movie will benefit from the clash between Ken, who is so visually oriented, and Paddy, who is totally verbal. Ken doesn't care about words yet he wasn't allowed to change one. I think it's great that those words were pushed to the limit by someone who thinks in pictures."

"I have a big speech after the first tank accident when Charlie takes me home. I talk about the dangers involved and the like. Ken put the camera outside the apartment and filmed coming up to the window. We wouldn't have come up with that if Ken wanted to just shoot words. Most directors would have shot my face and then Charlie reacting. I thought it was much more interesting for the audience to be outside peering in at this emotional scene. That came from the struggle between the visual and the verbal. There's a good mixture in this movie. I like things crashing into each other on the screen."

Haid agrees, stating that "in spite of the temporary frustration that may have flared up every so often, the creative view that united Russell and Paddy is what created the project. Those people are wonderful artists despite themselves."

With *Altered States* now in release amidst a flood of Christmas films, everyone connected with the film is wondering how it will be received. Will it become the 1980s visual touchstone a la

2001? Will it be dismissed as a post-Peter Fonda trip into scientifically salted metaphysics?

"I think the movie's impact will be lasting," enthuses Haid. "It will appeal to an intellectual audience, a Ken Russell audience, a science fiction audience, a college audience. It's a film that almost defies categorization. I feel that, after all is said and done, it's Russell who's the backbone of this film, the actual rock this film was built upon. I think this will prove to his critics once and for all that he is a technically brilliant maker of movies. He has brought an extremely difficult work to the screen, both emotionally and visually."

"I think that some people will go into this with an attitude," offers Blair Brown, "either pro or con because of Paddy and Ken. It's going to be a controversial film. Maybe if it had just appeared and we all had used different names, people would judge it on its own merits. At one point, because of all the Hurts in heavy makeup on the screen now—John Hurt in *The Elephant Man* and Bill Hurt in this—we thought of changing all our names. 'Ken Hurt presents a film by Paddy Hurt starring Bill Hurt, Blair Hurt, Charlie Hurt and Bob Hurt.' Maybe we could have snuck it into theaters that way."

No matter what the picture's commercial fate, everyone concerned with this cosmic love story agrees that it's not your typical movie. Asked to define it, Charles Haid shakes his head. "It's horrifying. It's shocking. It's amazing. It's new. I don't know what it is.... but can you imagine the visceral impact of this thing in a theater holding 2,000 people?"



Mason (Charles Haid) and Emily (Blair Brown) anxiously keep their vigil while Jessup, on the monitor, alters his state.

To Float, Perchance to Dream . . .

A first-hand account of floating in an isolation tank.

By BOB WOODS

"In these experiments, I discovered other spaces, found other maps, and discovered relatively safe means of going into these places. . . ."

—Dr. John Lilly
The Center of the Cyclone

I arrived at the East/West Center for Holistic Health about 15 minutes early so someone could prep me for my virgin "float" in an isolation tank. I'd already read the book *Altered States*, and seen the movie—I enjoyed both—and my curiosity had been appropriately sparked.

Charles Docherty, a representative of Tranquility Tanks, the center's commercial isolation tank business, sat with me for a few minutes, explained the dynamics of the tank itself and offered me some pointers on how to float and other various particulars. Then he led me to the tank room. The tank, a rectangular black box, occupied most of the space, along with a couple of closets and a shower stall. The softly lit room was quiet and rather warm from the heated water inside the open tank. After pointing out where everything was, Charles left me, but not before giving a nudge to the series of light prisms, suspended from the ceiling, just in front of the light, which cast a multi-colored movement around the small room. I was all set, relaxed and in a good state of mind.

I stripped (yes, you float naked) and stepped into the shower. Since the tanks are for public use, they ask all "floaters" to wash and shampoo before going in. After I emerged from the shower, I stuffed wet cotton coated with Vasoline into my ears to keep the water out. I spread a bit of the petroleum jelly on a small, open cut on my hand, too, since I knew the salt water would burn it. I looked at my dripping self in the mirror, shrugged my shoulders, took a deep breath and stepped into the tank.

I sat down with my back to the rear of the tank and pulled the door shut: pitch black. The water felt like luke-warm

bath water, and felt somewhat thick with the salt. I lay down on my back and the water came up to about an inch from my eyes and almost to the tops of my shoulders. I floated like a duck on a pond. As I closed the door of the tank behind me, I had many images running around my brain: Would I emerge a simian creature as Dr. Jessup did in the film? Would I have wild hallucinations as Dr. Lilly had? Would I simply float for an hour and then get out and leave? Well, none of these things happened, but I did come out with a fairly unique impression.

The effect was immediate—a unique sensation. It was as if I had stepped into weightlessness. It was completely black and I couldn't hear a thing outside the tank. All I heard was my breathing, my heart beating and the blood rushing through my head. It really did not feel like I was floating in water.

I spent the first five to ten minutes acclimating myself to the tank itself: get-

ting an idea of how wide it was, seeing if I might drift to one side, finding a comfortable position to float in. The three basic floating positions are with your hands off to the side a bit, with your hands behind the back of your neck fingers locked together, or with your hands up over your head. After experimenting with each position for a couple of minutes, I settled on the behind-the-neck one. I spread my hands and feet out to touch the walls of the tank and position myself in the very center. I put my hands comfortably behind my neck, slowly pulled my legs back in (if you "make waves," you tend to drift into one of the walls, which can be distracting) and prepared for some serious floating.

I had been in the tank for about 15 minutes, I'm guessing, at this point. The time went by quite slowly. While getting myself accustomed to the tank, most of my thoughts were taken up by those immediate concerns, but once I settled down, my thoughts began to wander.

The Isolation Tank: Profound Relaxation

Developed by Dr. John Lilly, isolation tanks offer a unique environment for rest . . . and, in some cases, more.

By BOB WOODS

My first introduction to isolation tanks was back when I was about 12 years old, sitting in the basement watching an episode of *Hawaii Five-O*. The evil Oriental, Wo Fat, was attempting to mush Steve McGarrett's mind by immersing him in a tank of water and shutting him off entirely from the outside world and all of his sensations. The total lack of stimulation, so Wo Fat figured, would crack even the steeliest of minds.

Fifteen years later I found myself

stepping into an isolation tank (see the preceding article for a first-hand account). But I was not there at the hand of an evil genius. I had read Paddy Chayefsky's novel, *Altered States*, and had recently seen the movie. So my interest in tanks had been greatly aroused. But how does one prepare to go into an isolation tank? I decided to look into the work of Dr. John Lilly, the scientist who first developed the tank in 1954 for experiments with mental patients.

First of all, what exactly is an isolation tank and how are they used? What's the point? In his work with schizophrenics,

I had practiced Transcendental Meditation when in college, and it proved to be a very relaxing thing to do. I noticed similarities between meditating and floating, especially with respect to the way my thoughts moved. In meditation, I felt sometimes as if I was dreaming, while in reality I was wide awake and fully conscious. The metabolic rate is down to a minimum—at times deeper than when in the deepest state of sleep—and the mind is pretty much free of dealing with the body. Well, in the tank I was just about completely independent of my body. I found myself breathing very slowly, and a couple of times found myself hardly breathing at all.

By now I had gotten over the absence of light, sound, touch, smell, temperature—my body. I was in what Lilly calls profound relaxation, and my mind wandered all over the place. Normally, we tend to think in verbal images; about people, places or objects that are “on our minds.” Now I began moving away from that confinement and bringing thoughts out from other places. For instance, and I suppose it’s not terribly surprising, I started have “womb fantasies,” trying to recall the feeling; not the event, but the feeling. I didn’t conjure up any pre-natal images or anything like that, but I did have a deep feeling of euphoria, warmth, comfort, security.

I thought about a couple of people who are close to me now, about some old friends who I hadn’t thought of in ages. I experienced dull flashes of light from behind me—a common reaction in the ab-

sence of light, I am told. I also felt as if my whole body was turning in a clockwise direction, again a classical reaction (some people sense that they are drifting down at an angle). I “came back” a couple of times, almost waking from sleep, but I knew I wasn’t asleep. I think this illustrates that there is such a fine line between the conscious and subconscious. I’m not sure if it was one of those “leaving-the-body” experiences, but I surely was not aware of my body at those moments.

I drifted into the side walls a couple of times, which immediately forced me back to dealing with my body. I easily re-centered myself. I had lost the sound of my breathing, heartbeat and the blood rushing in my head. The salt made my mouth dry, and I had to lick my lips a couple of times. Each time I did, that simple action was enough to bring back the sound of my heartbeat. The darkness went away, too, since my eyes had no work to do, and I had to blink a few times to tell whether my eyes were opened or closed.

I had no idea how much time had passed. It definitely didn’t seem like an hour, so I was surprised when Charles came in to the room and lightly tapped on the side of the tank to tell me my hour was up. (There is really no prescribed time limit, but for the purpose of accommodating everyone, the usual limit is an hour.) I was so out of it when Charles quietly called my name, that I almost thought for a second that it was the Lord calling down to me or something. It took

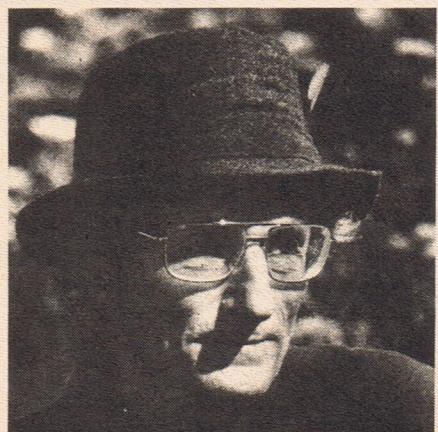
me about 15 seconds to get out some kind of sound to let him know I’d heard him. I took me another ten minutes before I could—would—let myself out. I felt as if I could have stayed in for at least another hour. As I lifted my arms up, they felt like they weighed a thousand pounds apiece—welcome back to gravity. I didn’t quite feel like Dr. Jessup when I slowly propped the door open, but I did sneak a quick glance in the mirror... just to make sure I was still a 20th-century being. I was... I am.

I stood in the shower and let the hot water beat down on my neck. I was incredibly relaxed and loose; the way you feel after a much-needed, totally refreshing sleep. I guess I was a bit spacey, but I was fully alert and energetic at the same time. I kept shaking my head and saying, “Yeah, that was real nice, a very nice thing to do for myself.” I was sure I would be back. Well, I was back, twice in that same week. Not only did I want to have a firm enough experience in order to write this article, I really wanted to go back in.

All in all, the experience was amazing. I enjoyed it immensely, and am seriously considering making it a regular habit. At this point it is chiefly an incredible source of relaxation, but I think that over time it could prove to be increasingly beneficial mentally as well as physically. I would recommend floating to anyone who’s interested, and my only advice would be to go with a completely open mind, free of any expectations. Other than that, have a great float. □

Lilly built his first tank in ’54 with the premise that, if you deprive a person of his external stimuli, the brain will simply go to sleep; without environmental input, the brain will not function. Lilly quickly discovered this theory to be far from the truth. The brain was anything but asleep. In fact, Lilly learned that the brain functions independently of the distractions of the outside world, therefore allowing the subject in isolation to explore some of the deeper facets stored within his memory banks.

Lilly describes this phenomenon in his book *Programming and Metaprogramming in the Human Biocomputer*: “Assume that the subject’s body and brain can operate comfortably isolated without him paying any attention to it. This belief expresses the faith that one has in one’s experience in the isolation situation, that one can consciously ignore the necessities of breathing and other bodily functions, and that they will take care of themselves automatically without de-



Dr. John Lilly

more than a what-you-see-is-what-you-get program; the external world is their only reality, and for those individuals the isolation tank can be used as a source of rest and relaxation. The other use is for those who perceive their world as comprising both external and internal processes. They may be interested in self-analysis, meditation and altered states of consciousness. For these individuals, the tank represents an environment in which to experiment with their minds.

Overall, use of isolation tanks can be summed up with Lilly’s words from his work *The Deep Self*: “The tank experience is a very refreshing one, a resting one. If one wants to push further than this, one can do so to the limits of one’s mental discipline and to the limits of one’s imagination.”

Lilly’s initial tank was a rather crude contraption compared with today’s sleek models. The first tanks were verti-

(continued on next page)

Isolation Tanks: Profound Relaxation

cal, and the subject had to be completely submerged. This required them to wear a clumsy headpiece that allowed them to breath underwater. Tanks such as those made by the Samadhi Tank Co. of California (see the following list of manufacturers and commercial tank centers) are horizontal, and the participant floats on his back in a saltwater solution.

The tank is approximately three and a half feet wide by seven feet long by four feet high, with a slanted door on one end. Constructed of watertight, light-weight plastic and insulation, the tank is filled with a 80/20 mixture of water and Epsom salt, respectively, which is filtered after each use. The 20 percent salt solution allows anyone to comfortably and safely float. The 10-11 inches of water are kept at a temperature between 93 and 94 degrees F. The body's temperature (98.6 degrees F) raises the temperature of the water just along the top layer of skin a few degrees. What this does, in effect, is give the subject no feeling of the water temperature at all; no cool, no hot, only neutral.

In talking to people about tanks, it becomes clear that many have heard of them but that few have a clear idea of what they are or how they work. The most constant fear—for there are mostly

fears about them—is the very nature of isolation. Many feel they would be trapped in the tank. They are surprised when told that they can easily open and close the door at will. Others fear they would not be able to float ("I can't even swim," is a common comment) or that they might drown. But with the salt-to-water ratio in the tank, a person of any size and weight will float like a cork, and the dynamics of buoyancy make it nearly impossible for the body to turn over, even if the subject were to fall asleep (a very pleasant experience, I am told). And the bitter taste and the eye-burning nature of the salt would quickly wake a person in any case.

In *The Deep Self*, Dr. Lilly discusses the absence of tactile sensations and its effects inside the tank. He points out how dependent we are on the presence of other people in our lives, and that this is one of the major features of being inside the tank—the utter solitude. The total lack of light, says Lilly, is not complete, however; one can still "see" in the dark. Classically, people notice cloudlike phenomena, or points of light, flashes of lightning, etc., depending on their state of mind. Though light is easy to eliminate, it still can be "seen."

Sound is a different matter. Lilly

states that sound can easily be transmitted through the water, and so recommends utmost care in insulating the tank. Then there are intrabody sounds: stomach gurgling, heartbeat, blood rushing through your head. Yet with some practice, and by taking certain precautions before entering the tank, these can be controlled.

The floating sensation completely eliminates the body's specific gravity. You feel weightless. If you are especially tense, you will feel yourself floating, but once you're relaxed, this too disappears.

Lilly outlines miscellaneous sources of stimulation and explains how these can be attenuated to ensure a maximum float experience. He goes on to discuss other aspects involved with the tank and its effects on the body. He then runs through a list of items in a sub-chapter entitled "Psychopharmacology," in which he offers his opinion on the uses of substances such as tobacco, caffeine, alcohol and various drugs. There is no advocacy involved; just discussion.

Warning against letting the tank's possible benefits become a crutch for dealing with one's realities, Lilly concludes: "By integrating/organizing/meditating on tank versus non-tank experience, one discovers for oneself the use and the usefulness of this restful tool in one's own planet-side trip."

Where to Float

With the release of *Altered States*, there is bound to be a lot of people interested in tanks. It may not go beyond the casual interest, but for those who might want to try out the experience, here is a list of tank centers and manufacturers:

Manufacturers:

Samadhi Tank Company
2123 Lakeshore Ave.
Los Angeles, CA 90039
213/663-9481
Glenn and Lee Perry

Float to Relax Inc.
1491 South Pearl St.
Denver, CO 80210
303/733-0782

Tank Centers:

Samadhi Tank Company
(same address as above)

Tranquility Tanks, Inc.
141 Fifth Ave.
New York, NY 10010
212/475-5225
Charles Docherty

Samadhi Tanks-San Francisco Center
2001 Van Ness
San Francisco, CA 94109
415/927-0191
Bob Tyhurst

Float to Relax has set up several centers, plans to open more in the near future and has distributors throughout the country. Here is a list of each:

FTR-Denver
(same address as above)
Robert King

FTR-Aspen
DBA Aspen Tank Works
600 E. Main St.
Aspen, CO
303/925-6574

FTR-Vail
DBA Just Relax
Crossroads Shopping Center
Vail, CO
303/476-1748

FTR-Minneapolis
2433 Hennepin
Minneapolis, MN
612/374-3211

FTR-Philadelphia
524 South Third St.
Philadelphia, PA
512/458-8435

FTR-Houston
6300 Westpark
Suite 615
Houston, TX
713/974-5570

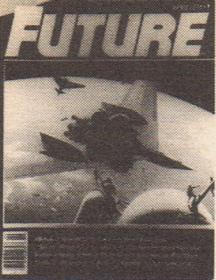
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Triage: Extinction by Design

Extinction is a fact of life. It happened to the dinosaurs millennia ago and it happened to the passenger pigeon a few decades ago. And it is destined to be the fate of scores of other species. Long ago it took 1,000 years for an extinction to occur. By some estimates, at least one species becomes extinct every year. The rate could easily rise to an hourly count by the end of the century. This concerns many scientists, ecologists and conservationists, who have begun to investigate a possible scheme for setting up a priority system for aiding species threatened or more seriously endangered with extinction.

During World War I, the French army devised just such a program to deal with their wounded soldiers at a time when medical facilities and personnel were at a bare minimum. Known as "triage," from the French *trier* (to sort out), the scheme divided the wounded into three categories: those most likely to survive with the least demand of medical attention; those who could survive without attention; and those who would be unlikely to survive no matter how much medical attention they might receive. Some wildlife experts believe that such a triage system must be implemented into our systems of caring for species whose populations are dwindling. As a result, there are a number of studies being conducted to explore the realities of a program to decide which species are more important than others.

The idea of establishing a triage system for endangered species was originally posed by Dr. Thomas E. Lovejoy, vice president of science of the World Wildlife Fund-U.S. He feels that the world is already on the threshold of a mass extinction of species, and he therefore advocates making conscious choices in choosing to save one species over another.

Lovejoy is serving as coordinator for a study by naturalists worldwide to determine if such a project is possible and how it might be devised. The investigation is being sponsored and financed by the World Wildlife Fund-U.S.

Dr. Norman Meyers, a wildlife ecologist and conservation consultant based

in Nairobi, Kenya, is working with this project. He is trying to find a way to evaluate the worth and status of different species. Dr. Meyers recently wrote a preliminary summary of the triage project in the *World Environment Report*, a journal of the World Environment Center, an agency of the United Nations.

"It is becoming plain that we cannot assist all species that face extinction within the foreseeable future," Meyers concedes. "Conservationists have limited resources at their disposal—finance, scientific backup, etc. Even were these

nia condor, the giant bird teetering on the verge of extinction. The plan will cost three million dollars, and critics wonder if that money might be more wisely spent on other species on the basis of their saveability.

Dr. Meyers argues that our present system has, unwittingly, achieved this goal. By electing to save the condor, he says, we have automatically written off other species by simple default. Nonetheless, Meyers says, "...the previous approach needs to be complemented by a broader, more methodical approach." He states that not enough scientific determination is utilized in these decisions, and therefore the species priority system is largely political; concentrating on species that are threatened and also have good public appeal like whales, big cats and seals. People feel a lot better about spending money to save a giant redwood tree than they do a lousy little snapdragon, even though both are endangered elements in a particular ecosystem.

Dr. Meyers hopes to devise a policy of triage that employs four basic criteria for establishing a species' "worth": biological—the general ecological, biological and genetic values, and the uniqueness, of the species; economic—the species' agricultural, medical and industrial worth; cultural and esthetic values; and special values of the ecosystem the species inhabits.

Meyers demonstrates his point in the case of whether to save the Bengal tiger or a crab in the Caribbean. "In addition to bio-ecological factors, there is need to consider economic, political, legal and sociocultural aspects of the problem. The Bengal tiger requires large amounts of living space in a part of the world that is crowded with human beings, but it could stimulate more public support for conservation than could the less-than-charismatic crab."

Another case in point is the plight of the highly endangered bowhead whale, which for centuries has been a prime factor in the livelihood of the Eskimos that live along the waters that the whales inhabit during part of the year. The Eskimo

(continued on page 69)



California Condor: Worth \$3 million?

resources to be increased several times over, we could not hope to save more than a small proportion of all species that appear doomed to disappear."

The case of the Tellico Dam project versus the endangered snail darter (see FUTURE LIFE #16) illustrates this point. In debating whether the fish's threat of obliteration outweighed the argued needs of the dam, major amendments were made in the federal Endangered Species Act. One was the imposition of the Exemption Committee (dubbed the "God Squad"), charged with balancing the scales between endangered species and public projects.

The triage theory came up with more recently when the government decided to set up a recovery plan for the Califor-

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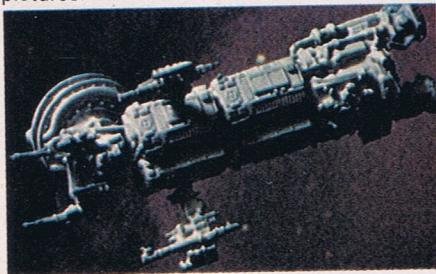
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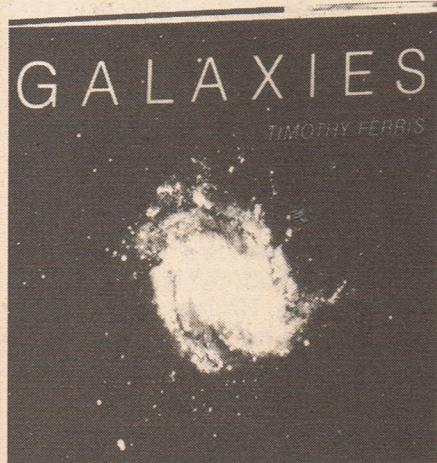
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Galactic Overdose

Grand Tour

John Muir founded the Sierra Club in 1892 to help protect the quality of the environment, and the club has been agitating and educating the public ever since. For the last 20 years, the Sierra Club has been producing a series of picture books showing some of the world's last unspoiled spots so that people won't forget what they're losing. These books have ranged from California's majestic redwood forests to the icy grandeur of Mount Everest.

Timothy Ferris has convinced the club to range a bit further and take on nature at its grandest with *Galaxies* (\$75.00 in hardcover from Sierra Club Books/



Scribner & Sons). *Galaxies* is nothing less than a tour of the universe directed by Mr. Ferris that starts in the star fields of our own Milky Way Galaxy, moves out into the Local Group of galaxies and then speeds on toward the edge of the universe.

Visually, the book is stunning. The publisher has taken advantage of the latest printing technology and the author has come up with the very best photos that the astronomers could produce (some exclusively for this volume). The combination makes for the most breathtaking view of the stars ever put between hardcovers. Sadly, such quality doesn't come cheap. The book's price tag is nearly as stunning as the photos. This means that those of you who are more into eating than book collecting can only pray for a paperback edition.

This is not another of the big, pretty but dumb books that have been so pop-

ular of late. The concept started with Timothy Ferry, a former journalist (UPI, *New York Post*, *Rolling Stone*) who won the Aviation/Science Writers Association Award for his coverage of the Viking landing on Mars, then went on to win the prestigious American Institute of Physics Prize for his first book, *Red Limit*, a biographical history of 20th-century astronomy. Lately, Mr. Ferris has been teaching English at Brooklyn College.

As you can see, the gentleman doesn't fool around, and this book is more evidence of that.

Ferris starts out with the basics: A journey to the center of our Milky Way galaxy shows us our billions of stellar neighbors. Then we travel on out through the Local Group, noting the diversity of forms that the galaxies take, discussing the birth, death and evolution of the hundreds of billions of stars that it takes to make up a single galaxy and the scattered billions of galaxies that make up the cosmos.

Galaxies are the building blocks of the universe—they are our cosmic environment. This fact is fundamental to any real understanding of where we are in the overall scheme of things—something we've figured out only very recently.

Ferris and the Sierra Club have done a truly marvelous job with this bit of cosmic show and tell. Ferris makes a good case for a deep connection between humans and the stars—we are made from the remains of stars, you know—and all with simple language that never stoops to the simplistic.

This book will change the face of the night sky for you. When you get to the end of this, you'll be suddenly amazed to find that you have a new and very real sense of awe and wonder when you look up and out into the universe.

Grand Romp

There are those of us who would rather not just look at the stars; we want to get out there and play. Douglas Adams has put together a fantastic little romp among the stars for this crowd called *The Hitchhiker's Guide to the Galaxy* (\$6.95 in hardcover from Harmony Books).

This book can be read several ways.

First, it can be read as the story of a book called *The Hitchhiker's Guide to the Galaxy*, a tome that contains the answers to many questions including: Why are we born? Why do we die? Why do we spend so much time in between wearing digital watches? This is a book whose cover bears the admonition "Don't Panic" and which states baldly that the intergalactic hitchhiker's most valuable possession is his, her or its towel.

It can also be read as the script for one of the BBC's most popular radio shows

DOUGLAS ADAMS

***The Hitchhiker's
Guide to the
Galaxy***



that is at present being re-done as a TV spectacular. (I'm sure that you didn't hear it here first.)

And, finally, you'll realize that this is the story of one Arthur Dent, a common Englishman, who, seconds before the end of Earth (condemned and cleared away to make room for an intergalactic expressway), is whisked away to safety by his friend Ford Prefect, a researcher for (all together now) *The Hitchhiker's Guide to the Galaxy*.

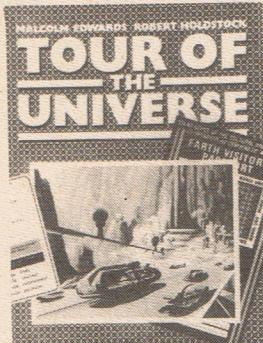
Dear Arthur stumbles from complication to complication, from chaos to cataclysm, saving and being saved by his friend Mr. Prefect, Zaphod Beeblebrox, the two-headed, three-armed President of the Galaxy, Marvin the Paranoid Android and a gentleman who is interested only in finding the planet where all the missing ballpoint pens have run off to.

This book is definitely not destined to become a classic. It will teach you nothing. It has no socially redeeming values other than a mordant wit and a taste for anarchy. It will make you giggle and it might even cause you to make funny noises in public. So, don't panic and don't forget your towel, just get your *Guide* and go.

Spatial Sightseers

Some people come back from trips to foreign climes with one bag of clothes

and three bags full of assorted debris—bills, notes, diaries, photos, postcards and ashtrays. Malcolm Edwards and Robert Holdstock have played “what if” with a couple of these collector-travellers in *Tour of the Universe* (\$11.95 in paperback



from Mayflower Books).

Now, this is one of those big, dumb books that there are all too many of nowadays. It's chock full of color paintings by young artists and it even has a semblance of a story tying the very disparate parts of the book together, but it's still much like an overlarge piece of cotton candy.

This is the story of a swinging young couple that has won a tour of all known space circa 2577. It starts with a hop to the Jupiter spaceport and ends with an accidental hop into the future (faulty circuit on their starcruiser, you know); and you see it all here. That's one of the problems: they show all—receipts, emblems, schedules, passports—all that and more in a jumble that defies untangling.

There are some very nice pieces of artwork and imagination by the team of young English artists that includes Angus McKie, Jim Burns, Tony Roberts and nine others, but the good stuff is in danger of drowning in the surrounding trivia.

And you can add to that problem the little (obviously) tacked-on complications that Holdstock and Edwards have contrived to keep the story going. Our young couple conveniently reveal themselves to be spies when things get really slow and then for a climax they (but not we) get a glimpse of the distant future when their spaceliner goes astray.

The book has more problems than plusses, so one must hope that Messers Edwards and Holdstock get things together better their next time out. This book is so slick that a sequel is almost a certainty. Publishers are, above all, slow learners.

Feds Look Up

One of the best-kept secrets in publishing is that the biggest publisher is

the federal government. The second best-kept secret is the fact that some of their books are really fabulous. So for those of you who love astronomical photographs and don't mind staying close to home, the Government Printing Office has put together a lovely set of looks at the nearest star in the sky in *A New Sun: The Solar Results from Skylab* (\$10.95 in hardcover from GPO).

This book was put out last year, but there's never enough publicity for these inexpensive beauties. This book has literally hundreds of beautiful color photographs, a clear, concise text with the most up-to-date information on our stellar neighbor and it offers a final look at the too often unlamented Skylab stellar observatory.

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Taste Test

Every science fiction reader must harbor at least one or two twisted theories about science fiction writers—those wonderful folks who offer us their visions of the future. Well, Charles Platt may disillusion a few of you with *Dream Makers* (\$2.75 in paperback from Berkley), a collection of interviews with his favorite SF luminaries.



reporting and subjective gossiping with great care. Such care, in fact, that in

some cases, he almost manages to prove that all those people with all these crazy ideas are just about as mundane as the rest of us.

That isn't to say that he will discreet you to sleep. There's no way that he could keep Norman Spinrad from making his usual scathing remarks about SF fans. There's no way he could make Samuel Delaney sound anything less than erudite. Yes, Virginia, even the most circumspect and respectful examination of this subculture will reveal that some of these folks are nothing like you and me.

One of the best things about this intense young Englishman's collection of interviews is its international flavor. He includes excellent interviews with keen surrealists Michael Moorcock and J.G. Ballard, plus a host of other Brits, to good effect.

So if you would like the equivalent of a pleasant afternoon with some of SF's stars, drop in on Mr. Platt. Just don't expect to see too many major aberrations, women, very young men or madmen at their best. Mr. Platt likes his parties dignified.

Shattered Stories

One of the voices that no one (Charles Platt included) can ever temper is that of Harlan Ellison. His latest set of uncensored screams has just emerged under the title *Shatterday* (\$12.95 in hardcover from Houghton Mifflin).

HARLAN ELLISON SHATTERDAY



Shatterday is a collection of 16 of his latest stories, each elegantly and, evidently, painfully written. The book opens with the familiar and elegiac "Jeffty is Five," the lovely little

story of a man who maintains his childhood until the harsh reality of the world we live in crashes in on him with fatal results. From this story of almost nostalgically sorrowful rage, Harlan goes on to ring all the angry changes that are his trademark in 15 dark and outrageous tales.

He pops the bubble of today's sexual frenzy with an acid wit in "How's the Night Life on Cissalda?" and "Would You Do It for a Penny?" He plays love-

Capt. Beefheart

(continued from page 36)

ly, scary games in "Shoppe Keeper," "The Man Who Was Heavily Into Revenge," and "In the Fourth Year of the War."

It's in the book's centerpiece, "All the Lies That Are My Life," and its closer, the title story, "Shatterday," that Ellison really rakes his readers. Here is vintage Ellison. The stories sing as the dialogue acquires the jagged vitality of real human speech, as Ellison circles dilemmas that really matter to him.

Now if you stop right there, you may run out and get Mr. Ellison's latest triumph. But I must confess that I am deeply ambivalent about this collection. Ellison seems angry at easy targets—evil is never banal in his world. The villains are harsh, unthinking thugs, sadistic sisters, or harridan old spinster neighbors. The world seems split simply into those for and those against us. And that easy split robs his stories of some of the vitality of his earlier work. The easy split makes his fine craftsmanship seem slick, even glib.

But this is good Ellison, and for most of us that's enough. Good Ellison means that these are stories that you read one a day if your psyche's in shape; one a month if it's a little shaky. But you do read them, 'cause he's always a nasty pleasure to watch. □

tion. If we consider sound as mass, then music—or ordered sound—becomes a three-dimensional, free-standing construction in the medium of colliding air molecules. Perhaps even more appropriate would be the term "sonic architecture," since monumental masses are being arranged and suspended with a gravity-defying sense of angular balance and grace—sort of like Frank Lloyd Wright on acid. Around a concrete-and-steel skeleton rhythm (a beat not played so much as fallen into, firmly controlled yet teetering on the edge), there is built a gleaming, metallic facade of piercing slide guitar, with decorative touches by harmonica and soprano sax, and an arched entryway from which comes the resonant cascading voice (seven and a half octaves high, and one of the loudest damn things you've ever heard).

Each Van Vliet composition is carefully designed—blueprinted one might say—on scraps of engram notepaper within Beefheart's head. They grow from themes he's hummed/sang/whistled into a small pocket recorder which are then coupled with bits of his divinely inspired, incoherent verse—stuff that can only be described as what a Venusian speaking in tongues might say, were he using English. The result is then meticulously taught to the scrupulously chosen musicians in Beefheart's Magic Band, with arduous close-order practise conducted until perfection is achieved. All this from a man who claims not to have had a minute of musical training. "The truth," he observes, "has no patterns."

Later, in his typically blasé-cryptic manner, Beefheart notes, "I ain't saying I'm the best. I ain't saying I'm the worst. I ain't saying. [pregnant pause] But I am doing." What else he ain't saying is just where the inspiration for his music is drawn from. He will claim that he doesn't listen to very much music, with the exception of a little Stravinsky (from whom he probably learned to spice his music with theatrical gestures and sonic shock-treatments). There's a strong blues influence apparent as well, especially in the instrumentation, vocal style (Howling Wolf meets the QE2's fog-horn) and rhythmic structure (the shifting elasticity of Mississippi Delta blues). Predictably, Beefheart treats this suggestion with derision. "My grandfather, he was my 'blues influence.' He used to play the lap guitar and rack harmonica when I was a baby. He was related to the

Duchess of Windsor." The best Beefheart will offer are abstractions of his instinct-rooted decisions, always stopping short of description. Talking about rhythms, he first confides without boastfulness, "I write the best drum parts," (he does) and then offers, "I've been trying to alter the human heartbeat—what an instrument the heart is." He pounds his chest, lub-dub, and by way of clarification says, "Music's poison, man, and the body loves to be fucked around." By poison, does he mean like a drug? Affirmative. Does he use any drugs? He shakes his head to indicate the negative, and says, "Just people."

Van Vliet is especially loath to discuss his role as an unwitting, unpaid evolutionary agent. The list of musicians and/or bands that have appropriated/borrowed/stolen/been influenced by the music of Captain Beefheart is a lengthy one (for starters, try Devo, the B-52s, Talking Heads, XTC, Magazine, Pere Ubu, the Residents, and then keep going), and all one need do is mention the wrong name, or even so much as hint at it, and the atmosphere in the room suddenly grows colder. With a disdain born of bitterness, he refers to artists who've followed his lead as "maraca heads" (accompanying the epithet with the appropriate air-forced-through-the-teeth noise) and says, "They think they're going to make money with music. I don't do music to make money!" It seems to offend his sensibilities to just speak the notion out loud. Van Vliet would much prefer to talk about the 19 flying saucers he's seen, or the time he spent hunting uranium in the desert with his truant officer instead of going to school, or the time he sold Aldous Huxley a vacuum cleaner ("I said to him: 'I assure you sir, this thing sucks!' and he bought everything I had!"), or even the fact that he and the astronauts were good buddies while the flyboys were training at an Air Force base near his desert home ("Those guys are hip!"))

Earthbound alien or not, Captain Beefheart/Don Van Vliet (though he prefers the latter, history will probably remember him as the former—such has been his life) has unquestionably exerted a major influence on the course of modern music, and quite possibly will be noted in the Encyclopedia Galactica as one of the important composers of the 20th (Earth) century. What's even more exciting from our point of view, is that the best is yet to come—if *Doc at the Radar Station* is any indication. Don Van Vliet will always keep moving. As he says, "Germs collect on stationary objects." □



"No, blast it! I said, 'Bring me some milk and a cookie'!"



PHOTO COURTESY STEVE R. DODD

Steve R. Dodd

A new and talented addition to the world of speculative art.

By BARBARA KRASNOFF

"I really can't explain how I come up with some of my ideas," says artist Steve Dodd in his soft Tennessee accent. Dodd, whose work first appeared in the Gallery section of FUTURE LIFE #21, has since been hard at work, and has amassed a huge collection of varied and beautiful artwork.

"I have fantasies that I hope to paint. Like right now, I have about 150 ideas that I'd like to paint, and I wish I could just run off a printing press. It's the process of sitting and painting I really don't care for; it's the finished product that's most important to me."

Dodd was born on August 11, 1951 in Parsons, Tennessee. "I've always been interested in science fiction," he recalls. "When I was, oh, three, four, five years old, I used to enjoy looking at space paintings; after I got old enough to read, I enjoyed reading science fiction. I was just captivated by anything to do with space."

After entering high school, Steve let his interest in SF lapse for a while and turned his attention to art. He attended Jackson State Community College for three years, and then went to Memphis State for another three years, majoring in fine art. It was during an art class that he rediscovered space. "The teacher told us to do something creative out of our imaginations, so a space picture was the first thing I did.

"One of the things that got me re-interested in science fiction was that my sister gave me a copy of *2001*, and I read it. I guess I just lean more towards the realistic side of science fiction. In other words, I like to do stuff that, when I do it, it looks like I've been there. And *2001* is that type of reading.

"After I read *2001*, I started reading everything I could get of Arthur C. Clarke's, and that's where I got my early inspiration for doing space art. And I saw the movie *2001*, and of course that's

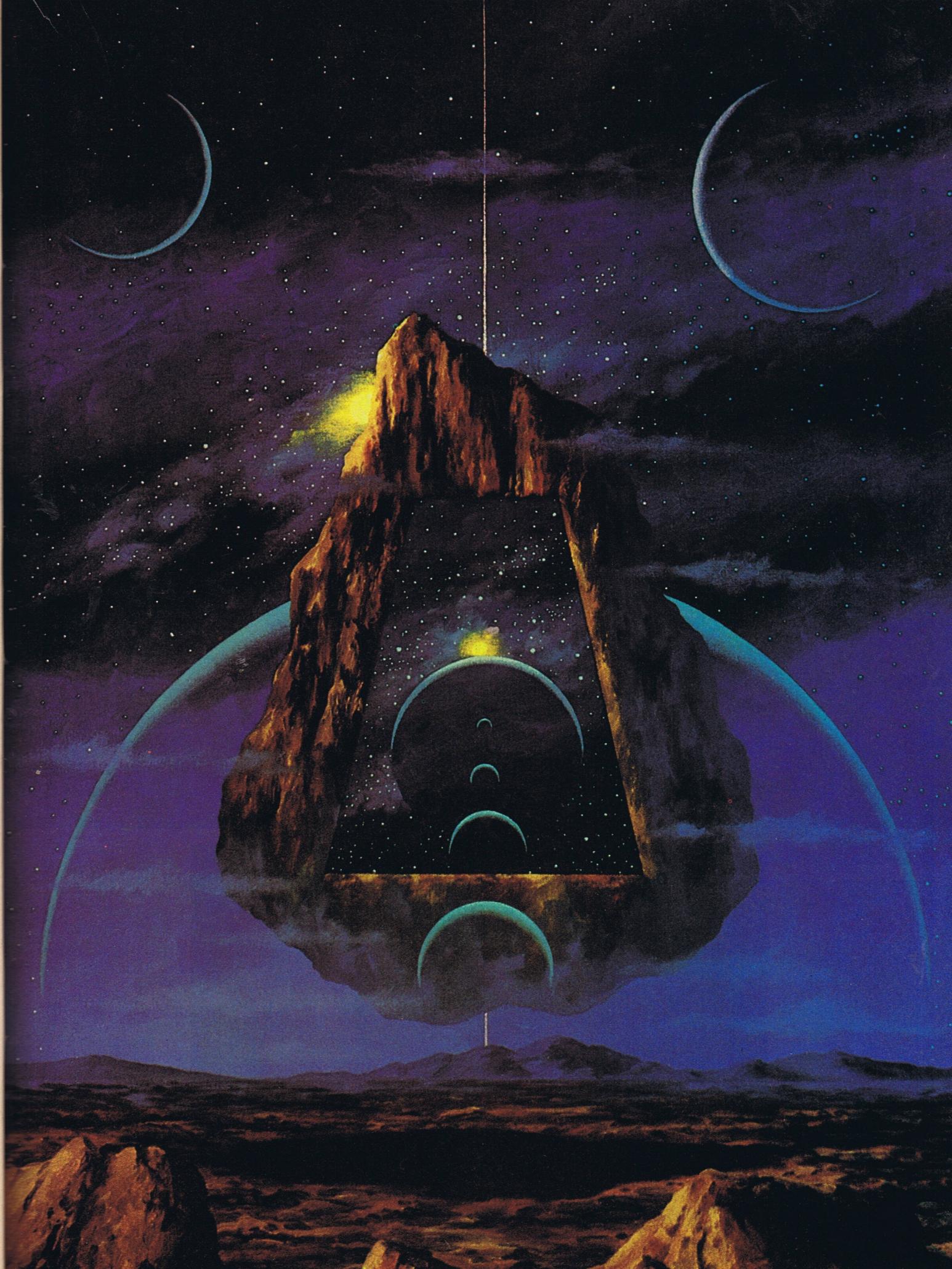
done on a speculative order—you know, realistic. I guess that's what influenced me to paint more speculative types of things; my mind sort of runs in that direction anyways. If I do a fantasy scene, it's fantasy; if I do a science fiction or that type of scene, it's speculative."

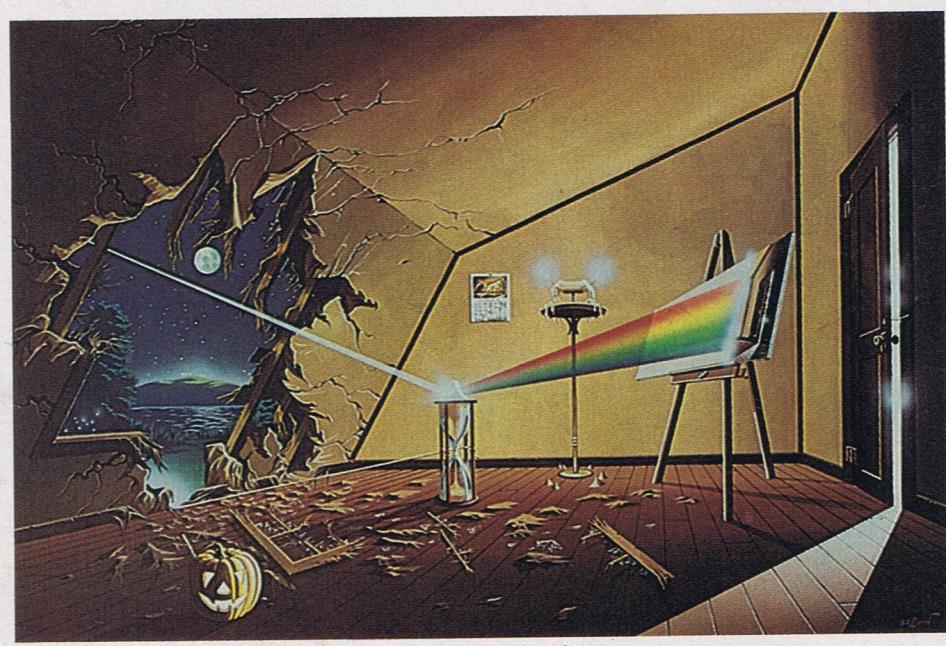
While Steve began his artistic career by painting traditional spacescapes (for example, the picture on page 62 entitled "Saturn From Mimas"), he has since branched out. Now, his portfolio includes an amazing variety of hardware, fantasies, abstractions and traditional scenery.

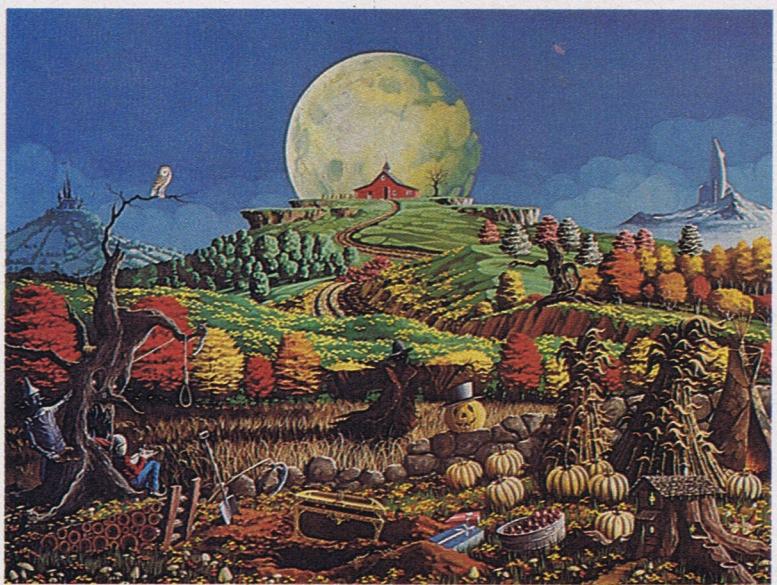
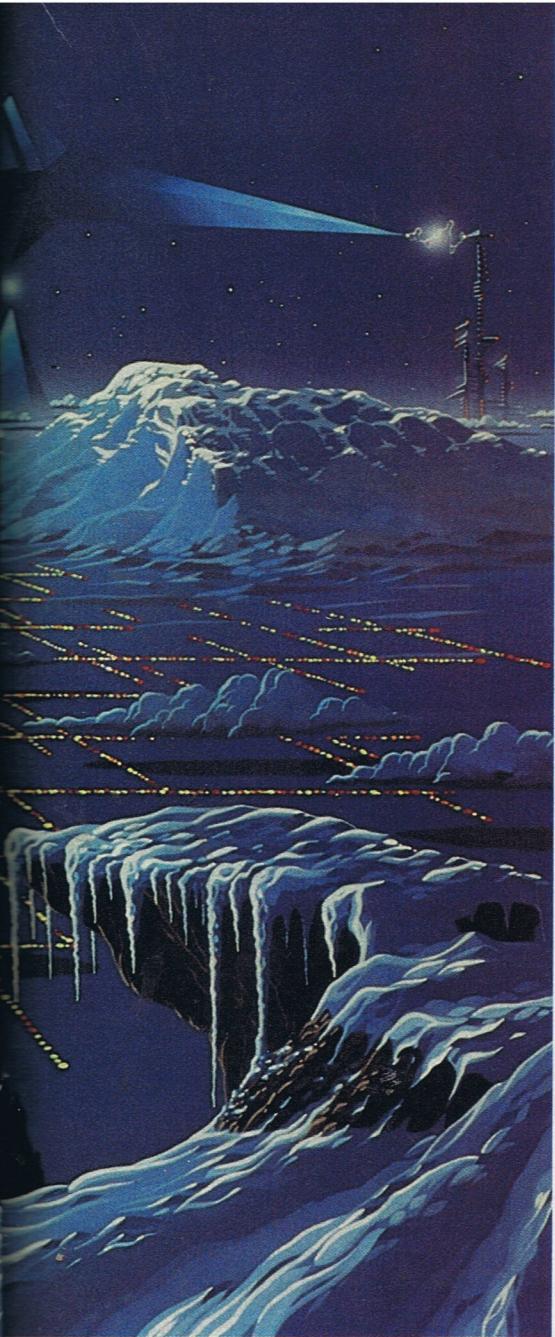
"I've come into different influences in the last two or three years," he admits. "I've listened to a lot of music, and have seen a lot of movies—just general things like that have influenced me more, and it's amounted to more fantasy-type stuff."

In fact, one of Steve's favorite paintings is the fantasy/pastoral scene on

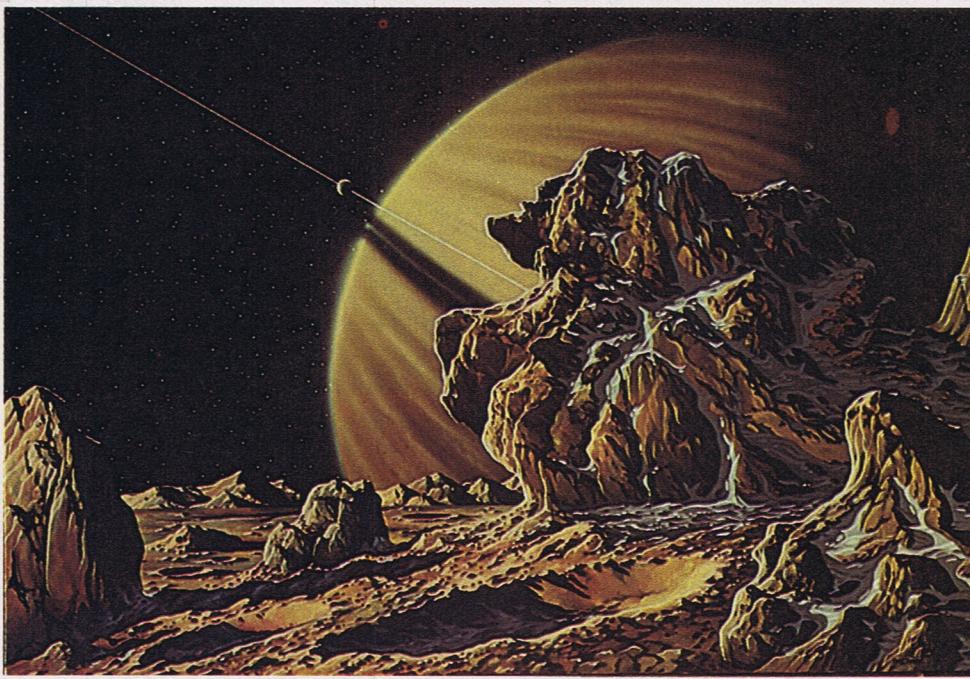
Opposite: "Space Fantasy #6"



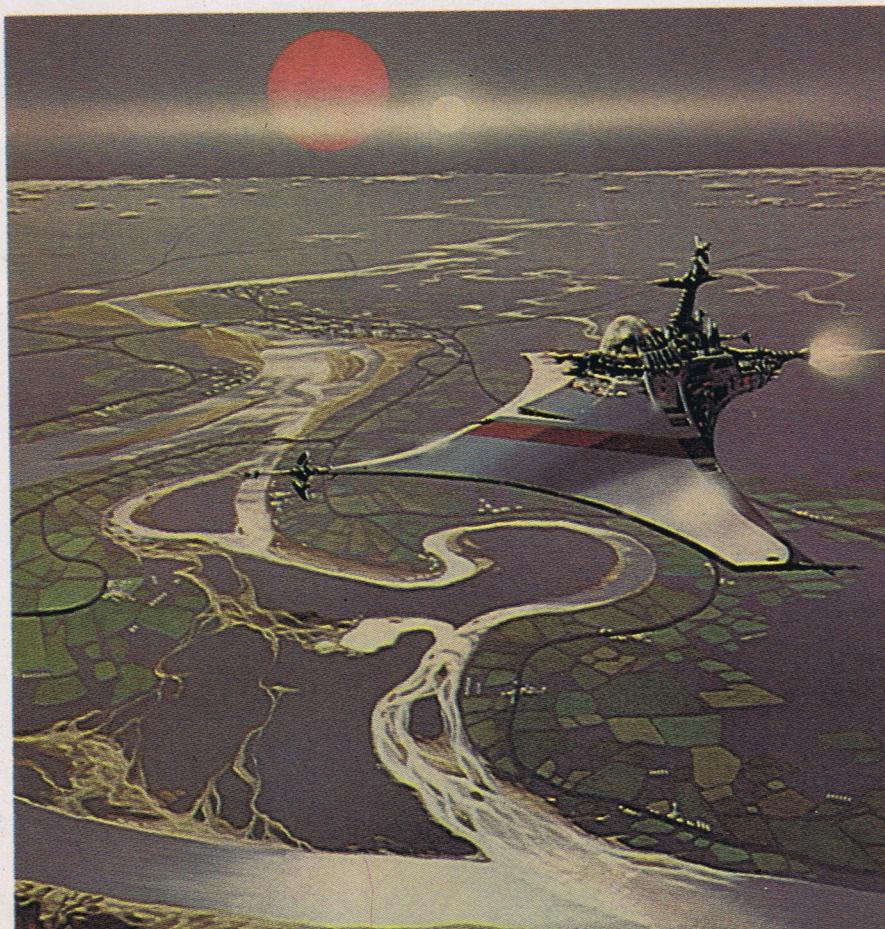
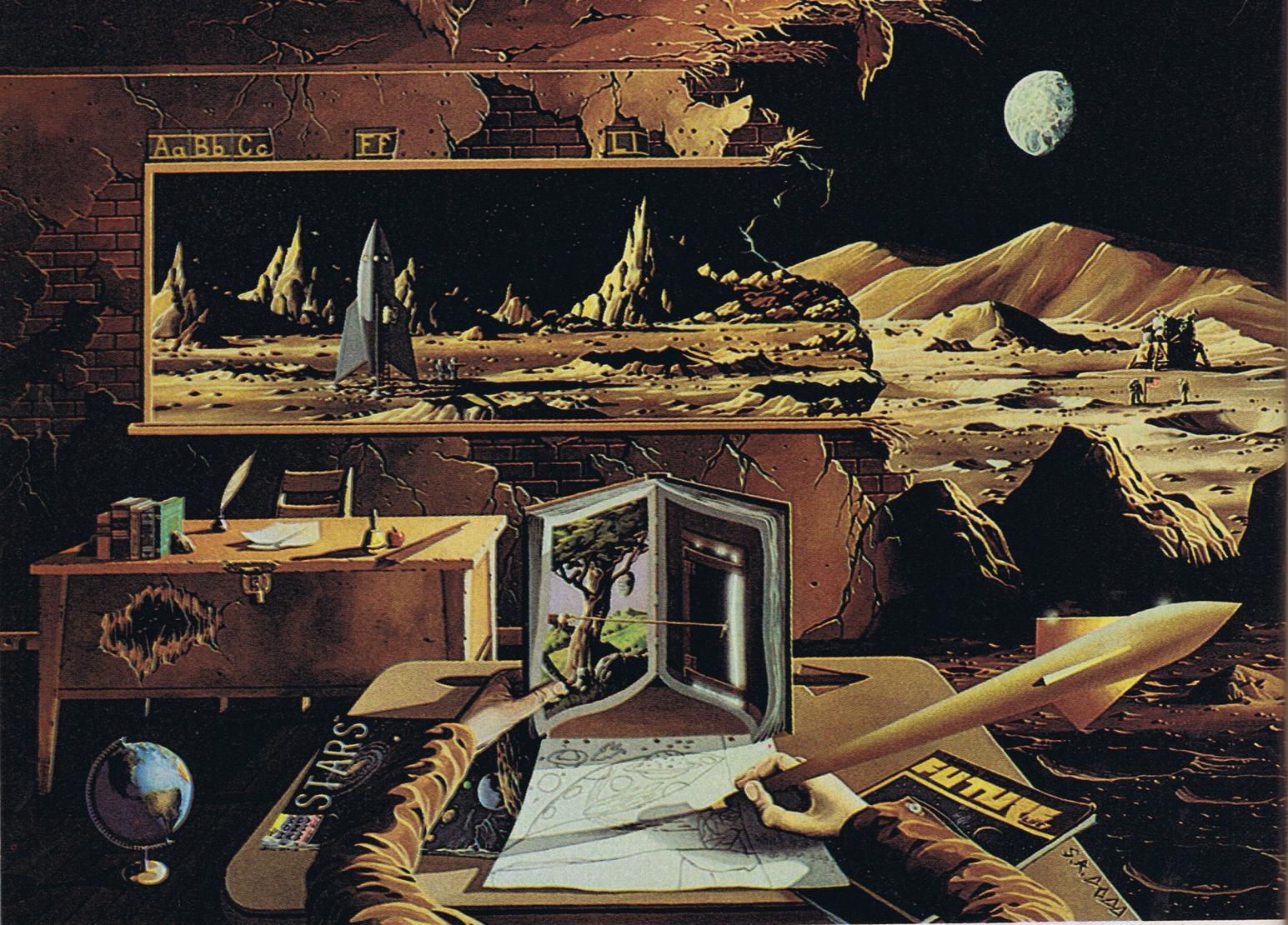




ART. © 1981 STEVE DODD



Clockwise from left: "Space Artist in His Studio"—a play on the usual artistic self-portrait. "Preparing the Trojan"—a huge alien ship, hundreds of miles long, comes over the horizon. "Final Harvest"—a Halloween fantasy. "Saturn from Mimas"—Steve Dodd's portrayal of the ringed planet. "Double Star Auar II"—"That's just one of my spacescapes, a system that's probably been painted by other artists too," says Dodd.



Above: Dodd's painting "Hand to Hand" symbolizes the past, present and future of his artistic life. Sitting at a school desk, his mind is on the mysteries of space. To the right is the copy of *FUTURE LIFE* in which he was first published. Left: "Aircraft Over Colony" is one of Dodd's hardware paintings. "Maybe when we colonize planets in other star systems," he says, "this is sort of the way it would look."

"I find that some of these fantasies that I'm doing cross over between being a science fiction illustration and a piece of fine art."

page 61, entitled "Final Harvest." "I have more of the Halloween-type fantasies, I guess, than any other kind," he says. "I don't know, there's just something about Halloween that's a magical time of year to me. It's magical and enchanting and everything; and I just tried to bring some of the elements of it together into a fantasy, sort of spooky and eerie...."

Recently, Steve has also begun producing rather abstract and surrealistic paintings, with speculative themes that tend to reflect his personal feelings about his life and his art. A good example is the work on page 60, entitled "Space Artist in His Studio." Dodd first developed the idea for this painting while considering the large number of self-portraits that have been produced by famous artists showing themselves sitting at their easels in some serene, creative studio environment. "And I thought, well, the space artist in *his* studio, what would that be like? A lot of people think of the space artist as being sort of, well, spacey; he's really not a person. So I decided to do a scene of space art and not show anybody."

A similar painting, entitled "Hand to Hand" (page 62), features as one of its elements a rather familiar publication. "FUTURE LIFE is the first time I'd ever been published," he smiles. "I just wanted to do something sort of symbolic of that. It's really just a blend of past, future and present: the past being where I'm at the desk, that's supposed to be when I was in elementary school. The way I thought back then, when I looked at the blackboard, I'd see a space scene instead of just a blackboard.

"I've noticed that people who don't really care for space art like a painting like that because of the composition and the colors and the harmony," he continues. "They can see it more from a fine art point of view than as just an illustration or something like that. I find that some of these fantasies that I'm doing cross over between being a science fiction illustration and a piece of fine art.

"A lot of times when I do a fantasy,

when I first come up with the idea, it is a lot simpler. And a lot of times when I first think of the idea, I don't paint it just then. I think it over about a year before I get around to painting, and sometimes longer than that. I'm painting ideas right now that came up over four years ago! And, over a period of time, I think of little details to add to them."

It is perhaps this penchant for detail that causes Dodd to use unusually large—24 x 30, 22 x 28 and 20 x 30 inch—canvases. Why does he feel the need to paint on this scale? "Well, I really don't know," he says. "It just evolved as my style. When I went to college, I guess I was influenced by other people, and everybody seemed to think pretty large. I know there's a lot of artists now who paint on small illustration boards. I just couldn't comprehend painting something tiny."

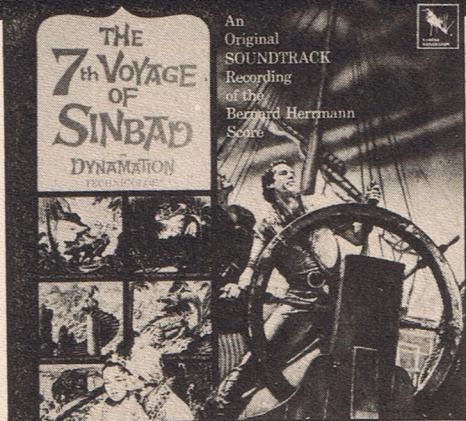
Steve is not only a talented artist, but an extremely prolific one as well. At the age of 30, he has assembled a collection of some 300 paintings and an unknown quantity of small works and sketches. "On what I consider a complex fantasy, like "Final Harvest," I take about two to three weeks; and a small one, say a 22 x 28 inch, I usually can do in four to five days." He pauses. "That would be saying I paint about eight hours a day easily; I can paint one in about 30 to 40 hours, or about 60 to 80 hours for the large cases."

While his work has, up until now, not been very visible outside the pages of this magazine, Steve hopes to become more widely known as a speculative painter. "I would like to begin selling to some places where I could get some exposure," he says, "like to corporations or businesses or whatever. My main interest is to get in on the publishing business. I'm interested in publishing art anywhere I can, like greeting cards, magazines, paperback covers, hardback covers, anything such as that. That's my main interest."

With his obvious talent for creating detailed, fanciful works of art, Steve Dodd shouldn't have any problem. □

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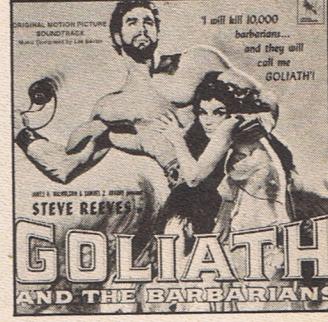
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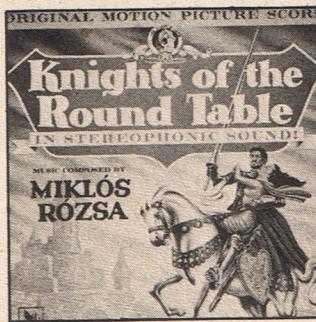
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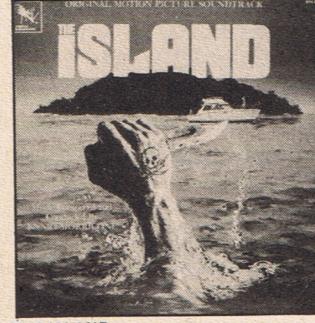
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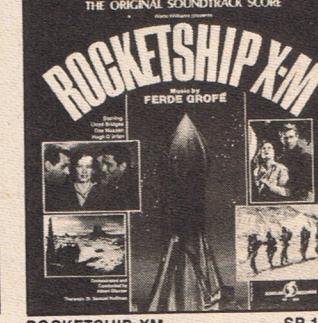
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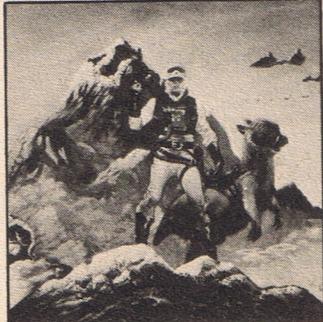
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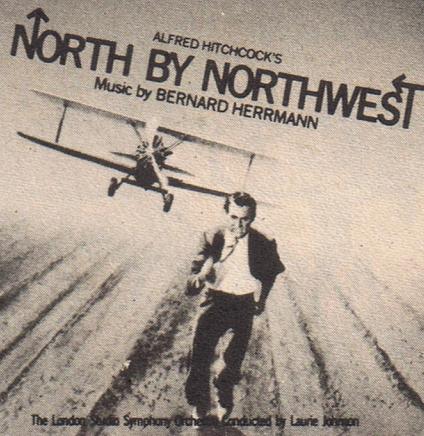
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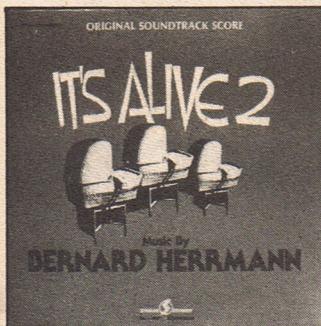
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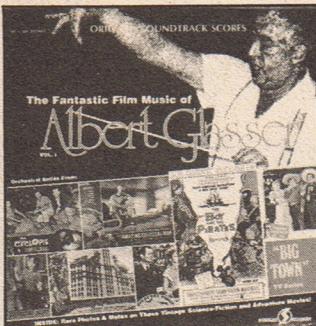
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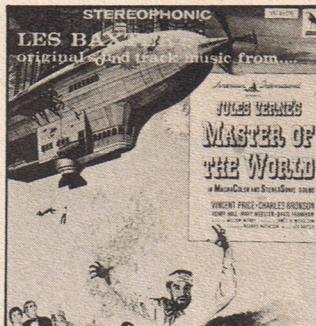
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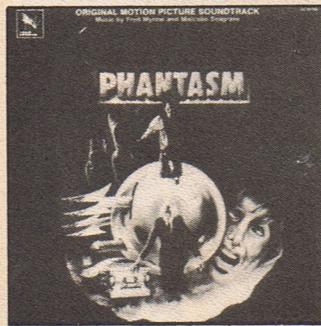
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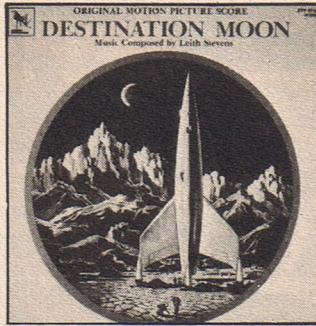
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SCANNERS

Mind Control With A Heart

Canadian director David Cronenberg scans the weird world of psychic phenomenon in what he calls a "science fiction film with horrific overtones."

By ED NAHA



Director David Cronenberg with *Scanners* star Patrick McGoohan during a break on the set.

How would you feel if you suddenly found another person's mind in your consciousness?" the speaker muses. "Would it be an exhilarating experience? Would it be a scarring, traumatic feeling?" A small smile plays across the face of Canadian filmmaker David Cronenberg. "It's an intriguing thought, isn't it?"

Cronenberg is making the rounds in Los Angeles to publicize his new film, *Scanners*, a science fiction drama exploring the plusses and minuses connected with telepathic prowess. Best known for such horror films as *The Brood* and *Rabid*, Cronenberg stresses the fact that *Scanners* is unlike anything

he has ever directed before. It is *not*, repeat, *not* a horror film.

"It's a science fiction film," he explains, "with horrific overtones. I think it has an emotional depth that many people who only frequent genre movies will be surprised at."

Scanners concerns the endeavors of the Consec Corporation's Dr. Paul Ruth (Patrick McGoohan) in creating a race of super-telepaths, or scanners. During a demonstration of Consec's most powerful protege, a renegade telepath named Revok (Michael Ironside) stretches his psi powers a bit and causes Consec's man to lose his head...literally. Shocked (and splattered) by the loss

of their top scanner, Ruth's team discovers a "natural," 35-year-old derelict Cameron Vale (Stephen Lack). Dr. Ruth draws out Vale's powers and sends him on a secret mission to infiltrate the underground network of rebel scanners. En route, Vale is befriended by telepath Kim Rosenberg (Jennifer O'Neill), who reveals the truth about the few hundred scanners scattered around the globe and the secret of Ruth's interest.

While the film does have its share of frightening moments and garish make-up effects, its storyline, according to the director, is more than a mere shock scenario or standard scientific film. "There's

PHOTOS: FILMPLAN INTERNATIONAL

a metaphor present," he says. "I think that beneath the obvious literal interpretation of many films of this genre, you'll find a symbolic one."

"At the core of the film is a very child-like fantasy. The lead character has a wild 'what if' sort of transformation. It's like when you're a child and you fall asleep dreaming, 'Gee, what if I woke up in the morning and I had the powers of Superman?' You always think about it in very oblique terms. Sure, it would be great. But would it? How would you handle those powers? How would people react to you? How would your life change? In *Scanners*, the lead character suddenly discovers that he has these immense cerebral powers. He's had them all along but has never realized it. He becomes the most powerful scanner in the world. His life is shattered as a result."

"I didn't choose the subject matter because I necessarily believe these abilities or powers exist. The existence of ESP or psi powers is not the question. There are people like Uri Geller and others who claim to have this gift. Fine. What's the most important point in this movie is seeing how these powers are used. How are the individuals treated and towards what ends? Are they treated like human beings or tools?"

"In one sense, it's a story about people who are different, for any reason. In a way, it shows that, in today's society, to be different is to be misunderstood. In this movie, the telepaths find that their powers are a curse more than a blessing. To have the kind of sensitivity required to be burdened with the thoughts of others is a painful existence. Despite their gifts, they are regarded with suspicion, fear and condescension."

"Dr. Ruth, the main representative of science, is the foundation for the scanner society. He uses his head and reasons: If I've found a few people who may one day evolve into beings who have untapped sources of power in their nervous systems, why should I waste my time searching around the world to find people further down the evolutionary scale towards this end goal? Why not find medical ways to bring about that evolutionary process quick and create a whole new species?"

"In the film, the researchers use a combination of chemicals and what-have-you to bring out this telepathic power to its fullest potential. They lose sight, however, of the fact that their guinea pigs are human beings. Now, I'm not condemning science in this movie. I'm not presenting a portrait of mad scientists but, rather, mad men. Dr. Ruth is so rational, so controlled, that he is in-



Mystery enshrouds the atmosphere of the chemical plant where a powerful mind-altering drug is being secretly produced.

sane... without really knowing it. Like so many people in authority today, he has fought the chaos outside for so long with a set of rigid, unyielding rules that, eventually, his sense of order becomes just as dangerous as the chaos."

Chaos nearly became the codeword for Cronenberg's well-intentioned film during its shooting schedule. Allowed only two weeks of preproduction for a nine-week shoot, Cronenberg found himself finishing his script as the film progressed. "It got really insane," he admits. "I'd be writing scenes at night, during lunch, whenever. There were also delays with the physical effects, and so we had to shoot around a lot of scenes, juggling the schedule accordingly."

Happily, a goodly amount of time for post-production solved most of the film's problems; the biggest of which being the failure of *Scanners'* complex mind-wars finale. "The final scene just didn't turn out the way I wanted it, so we re-shot it. Dick (*Altered States*, *The Exorcist*) Smith flew up here from New York to supervise his makeup effects and now the ending looks terrifyingly real and convincing."

The finished film, Cronenberg feels, should please both action movie buffs and those SF fans who like their science well represented on the screen. "Everything seems very accurate," laughs Cronenberg. "But I tend not to really research my movies because I'm a very lazy person. What I do is take a premise, try to understand it from a human stand-

point and then invent things. I find that what I invent is pretty convincing. It usually fools people who are pretty close to the subject. On this movie, for instance, we have a lot of tests and experiments that were later viewed by a group of parapsychologists, researchers who are very interested in all developments along telepathic lines. They found the concepts very interesting and accurate."

"It was the same way with *Rabid*. I did a little bit of research about parasites and came up with these creatures that came out of people's armpits. We used a medical lab for some of the sequences and the doctors there were fascinated with our monsters. Not only did they say they were possible but added that they had photos of real parasites found in Third-World countries that would scare the hell out of me. They said that the reality there would look like horror fantasy here. They were amazed that I hadn't thoroughly researched the subject. I just have one of those minds, I suppose."

About to blow the minds of moviegoers throughout the country, *Scanners* should be able to, in Cronenberg's opinion, keep audiences on the edge of their seats on several levels. "Horror fans should love the effects," he says. "Science fiction fans should enjoy the premise. But I think a lot of regular, ordinary moviegoers should be able to identify with Vale as the solitary scanner, the outsider, the guy who doesn't really belong."

Graying Earth

(continued from page 27)

the century to over 23 million today. The number of mature and elderly people increases dramatically each day. Medical technology advances, the average life-span continues to increase, the population has stabilized and birthrates and deathrates have equalized and are falling.

In all developed countries of the free non-Communist world, there was a baby boom after World War II. It started in the United States, where the number of births increased by almost 50 percent within the years 1947-49. Japan followed suit in the early 1950s with an equal, if not greater, increase in birth numbers. The last major developed country in the free world to have a baby boom was Germany in the mid-1950s.

During the 1960s and 1970s, as this group—called “the bulge cohort” by demographers—moved into its teen and college years, its social movements, fads and trends swept the country. As the cohort ages, its impact will be even more pronounced.

Over the next decade, the post-war babies will move into the 25-45 age bracket. By 1990, 41 percent of the population will be in that age group, 24 percent between 45 and 64, while 15- to 24-year-olds will comprise only 18 percent. Although the Census Bureau projects a 9.6 percent increase in the population as a whole, the plus-25 age categories are expected to grow at more than double that rate. After 2010, the ranks of the over-65 set will swell with the bulge cohort, and members of the baby-boom generation will continue to join the over-65s for the succeeding two decades. Today, the median age in America is 30; by the year 2030, it will be 50.

Today's over-65s are a diverse and heterogeneous group, since everyone—white, black, Indian, Democrat, Republican, doctor, janitor—who does not die grows old. According to the Census Bureau, “The aging control a disproportionate share of the nation's wealth.” The poverty rate among elderly whites is 12 percent; among elderly blacks it is 34 percent and among elderly Hispanics it is 23 percent. The official U.S. poverty threshold is \$3,917 for older non-farm couples, and \$3,116 for older non-farm unrelated individuals. The average person over 65 earns \$4,561 per year.

The large majority of people over 65 pay for their own clothes, their own food and all of their own rent, and most own

their own homes. Many elderly property owners have been plagued with soaring property taxes, utility bills and maintenance costs. Their incomes have been diminished by inflation, and rising health care costs have burdened them further.

Since many of their problems are related to the economy, they have organized into effective lobbying groups on local, state and national levels. The elderly have select committees in both houses of Congress, and the White House has a special adviser on the problems of the aging and is planning a 1981 Conference on Aging. They have pushed through a law prohibiting forced retirement at age 65, and are currently battling for more complete government-sponsored health coverage, low-cost housing, in-home nursing facilities, improved public transportation and better police protection.

Senior citizens (a name which they hate) earn over \$60 billion every year and contribute over \$100 billion to the economy. According to a Harvard Research Center Study, one-half of all families under 30 who are buying homes are subsidized by parents or older relatives in the form of down payments and help in obtaining loans. Even children's birthdays and holidays bring the dollars out of elder's pockets, since one-third of these gifts are purchased directly or indirectly by older persons. It is their willingness to save, despite the double hex of inflation and interest taxes, that provides the banks' money for real estate loans. And the \$600 billion in public and private pension plans invested in common stock and corporate bonds make these funds the linchpin of the national economy and, according to Peter F. Drucker, constitutes a “bigger shift in ownership of the means of production (from management to the workers) than any that has occurred since the end of feudalism.”

Truly, these folks deserve some respect. And they're getting it. And so it must be, because we need them so badly. If there is any hope at all for a future, it lies with them. In her work *The Renaissance of Age*, Marjorie Borchardt, president of the International Senior Citizens Association (ISCA), sums it up best:

“... Experience, then, is the most valuable attribute of age in which the older people can take most pride. The deepest implication of the renaissance of age is in the influence of world peace. Who but the old, who have lived through several wars, are the best witnesses for peace? Peace offers the greatest challenge in the world today and it is

the responsibility of the old, possessed of wisdom derived from experience, to accept the challenge. The old can be an instrument for peace...”

Through global computerized libraries and individualized broadcast channels that are a part of the technological and information revolution, we should be able to tap into the vast storehouse of knowledge and wisdom that our elderly possess, and are patiently waiting for us to politely ask for. The story of the Graying Earth begins. It is being told in the many ways the elderly are actively influencing society at all levels, unfolding a pattern of action in lifestyle that will propel their heirs into a radically different future. Learning, working, living and loving are taking on new meanings.

Recently the Department of Health and Human Services (HHS) solicited research into the nation's retirement policies, both public and private, seeking to learn both the adequacy and cost of plans. One respondent was Robert Robinson of Los Angeles, who proposed a Senior Achievement Corporation that would provide the context for retired persons to learn new skills and enter into second and third careers.

According to Robinson, “This Senior Achievement Corporation cannot only retrain today's active retirees, but also lay the groundwork for retraining the liberal arts bulge cohort, who do not possess the manual and technical skills that will be required of tomorrow's work force.”

The desire to remain in the social mainstream through social careers and continued education has the elderly escaping the confinements of “age ghettos” and attending schools and universities around the world. In the United States, a program called Elderhostel will educate 50,000 seniors at 400 college campuses in 50 states by 1981. These two-week summer vacations far surpass the effects of medicine in revitalizing the elderly.

The most valuable role the aged will play in the future involves intergenerational cross-fertilization. Historical events pile up on one another like ice floes in a congested river, and what was recent too soon becomes remote and little remembered. Our elders are a vast resource willing and able to share hard-earned knowledge about whence we came. They provide continuity in a seemingly fragmented universe. They are the connective tissue of the human race, the binding force in our daily lives, the transitional elements in our star-bound saga, the locus of wisdom on a planet going their way.

Earth Control

(continued from page 52)

mos insist that they need to hunt the whales as part of their established ways of life, for their survival. On the other hand, conservationists counter that in order to save the whales from absolute destruction, they should not be hunted at all, and that the Eskimos can find other means of support. For the time being, the International Whaling Committee has given the Eskimos a somewhat loose quota on bowhead kills, but the debate is not over—especially since recent proposals to drill for oil in these same waters adds yet another minus factor for the bowhead's preservation.

Other triage projects include the present system used by the U.S. Office of Endangered Species, which allocates priorities by using a point system, whereby species are considered for listing as threatened or endangered according to the amount of data available on them and whether they are subject to "greatest," "medium" or "least" threat.

Another study has been completed by the International Union for the Conservation of Nature and Natural Resources, the UN Environment Program

and the World Wildlife Fund. The World Conservation Strategy, the title of the report, offers a rough plan that would establish priorities according to the severity of the species' threats and whether the loss will be wide ranging enough to affect other members of related species.

yet. Considering the benefits of some species—like the Amazonian wasp that kills pests plaguing Florida farmers, or insects used to treat cancer patients, or the African butterfly that proved essential in a genetics study—it would be a shame to base priorities on the haphazard grounds of the present.

"Nobody will like the challenge of deliberately consigning species to oblivion. But insofar as man is already doing so unintentionally, he might as well do it by design rather than by default."

Only 1.6 million of Earth's five-to-ten million species have been officially identified, according to Dr. Meyers, and even fewer have been provided survivability status. As humans continue to demand more and more space and thereby destroy more and more natural habitat, we run the risk of destroying flora and fauna that we haven't even discovered

Concludes Dr. Meyers: "Many tough decisions will have to be made. Nobody will like the challenge of deliberately consigning species to oblivion. But insofar as man is already doing so unintentionally, he might as well do it with as much selective discretion as he can muster and determine the future of species by design rather than default." ■

BACK ISSUES



#1—Backwinding Super-8 Film; Foreground Miniature Technique; Aerial Brace Construction.



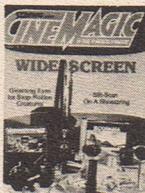
#2—Spaceship Modelmaking; Blood Makeup; Smoke Generator; Light Beam Effects; Making an SF Logo.



#3—Robot Construction; Developing an Animation Style; Fluid Art Animation; Electronic Special Effects.



#4—Aerial Image Optical Printer; Construction; Wire Armatures; A-B Rolling; More Electronic Special Effects; Fog and Mist Effects.



#5—Aerial Image Optical Printer; Usage; Widescreen Super-8; Slit Scan Effects; Gleaming Eyes for Stop-Motion Models.



#6—Amazing Electronic Gadgets—Cheap; Bring Your Alien to Life—Latex Masks; Basic Editing Techniques; Invisible Man Effects.



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In 1939, an unknown, Russian-born writer had his first story published in Amazing Stories. Within the next 40 years, his name—Isaac Asimov—aside from becoming legendary, graced the covers of no less than 200 books. Add to this literally hundreds of short stories, essays, articles, reviews and almost any other form of written language, and you have one of the most prolific authors of all time. Born in the U.S.S.R. in 1920, Asimov emigrated to this country in 1923 and became a naturalized citizen five years later. A precocious teenager, he left high school at the age of 16 and within three years received his first degree—in chemistry—from Columbia University. He went on to gain his masters and doctorate, and later became an assistant professor of biochemistry at Boston University's School of Medicine, a post he resigned to become a full-time writer. Asimov's short story "Liar!" (1941) introduced his now-famous Three Laws of Robotics. His first novel, Pebble in the Sky, appeared in 1950. That same year he finished I, Robot, and a year later completed the first book of his epic Foundation trilogy. His writings have earned Dr. A number of Hugo and Nebula awards. With his background in science—and the proud fact that he was our very first "Tomorrow" columnist—it is most fitting that Asimov offers his wise words on genetics in this, our third anniversary issue.



selves that can be used to supply the new cells that are continually being formed—including new egg cells and sperm cells that give rise to new individuals altogether.

We have also learned how to pry apart DNA molecules with great care at specific sites and how to then put the fragments together again in the old order, or in a new order. We can even take fragments from two different DNA molecules and put them together to form a molecule that had never before existed. It is this recombining of DNA molecules that is referred to as "recombinant DNA" research.

This means we are slowly learning how to control the molecules that serve to control the cells. We are learning how to design new organisms—or at least organisms with new chemical abilities. Thus, by fiddling with the genes in certain bacteria, we can produce a bacterial strain that will have the ability to design protein molecules that are absolutely identical to those of human insulin—and have actually done so.

Until now, we have had to obtain our insulin—essential for diabetics—from cattle and swine. Such insulin works, but it is different in minor details from human insulin. It is possible for the human body to develop allergies to animal insulin. What's more, that supply is inelastic since it depends entirely on the number of animals slaughtered, with each having but a fixed supply of insulin.

The newly designed bacteria, on the other hand, produce the real thing and can produce it at any necessary rate, depending on how many cultures we establish and how tirelessly we can adjust them to do their work.

More feats of this nature are expected in the future. To be sure, there are those who fear that, quite unintentionally, strains of bacteria may be developed with fearsome pathogenic properties; disease germs that the human body has not encountered and cannot fight off; that they will somehow escape from the laboratory and lay humanity low with a super-epidemic.

The chances of this are extremely low and it would be sad to give up the certain benefits of recombinant DNA research for fear of the trace-dangers of catastrophe. Far better to search for ways of reducing the danger to a still smaller level—as, for instance, by setting up laboratories in orbit about the

Revising the Pattern

It is possible that, among all the revolutions that face humanity as it attempts to increase further its knowledge of the Universe, the most significant, the most hopeful and the most dangerous is the one that involves cellular biology.

The characteristics and abilities of human society are built upon the characteristics, abilities and the co-operative or competitive behavior of the human beings that make it up; at least so far, since all our machines and automatic controls have, up to this point, failed to eliminate the possibility of "human error."

In turn, the characteristics and abilities of individual human beings are built upon the characteristics, abilities, and the cooperative or competitive behavior of the individual cells that make them up. The characteristics and abilities of each cell is based on the characteristics, abilities, and coopera-

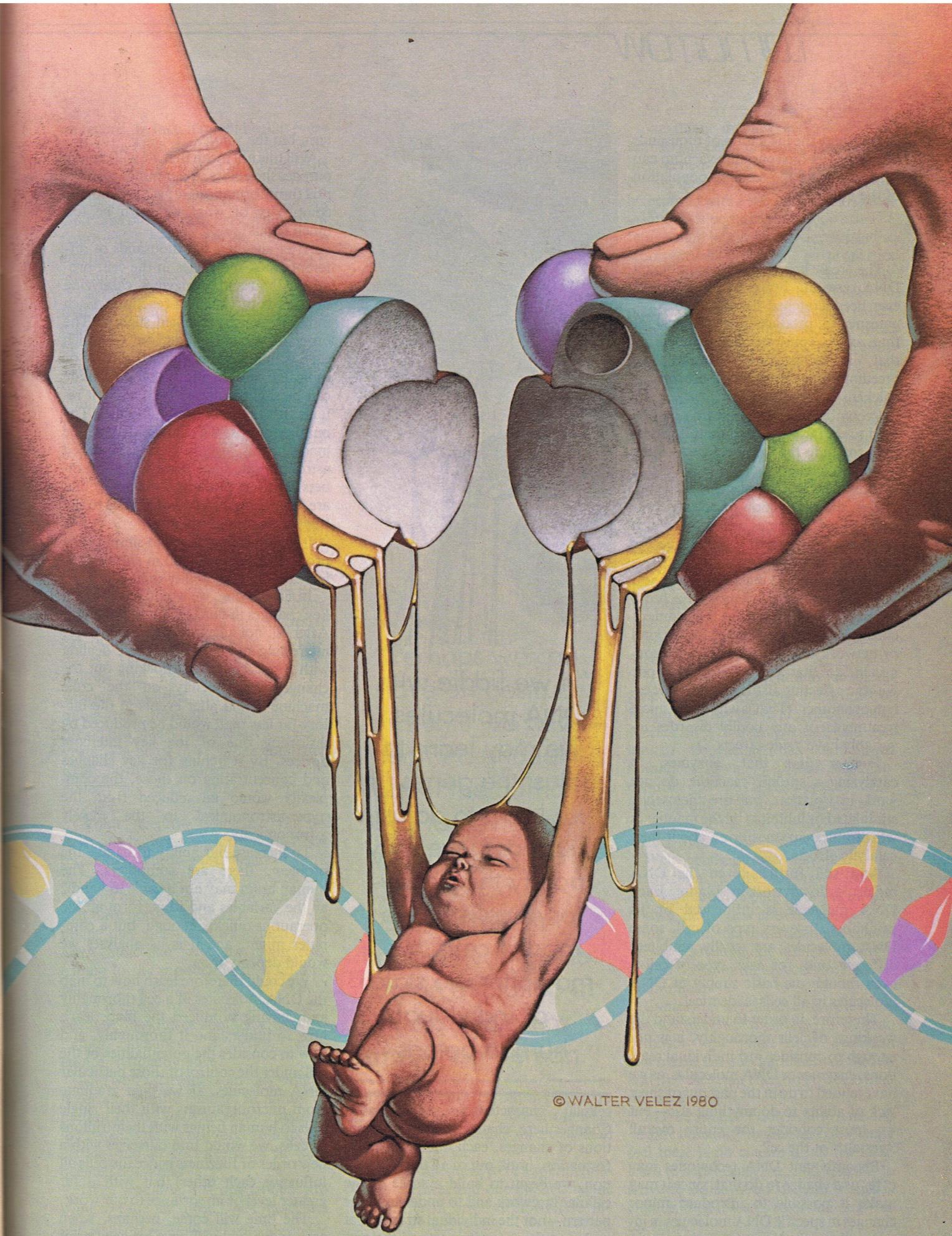
tive or competitive behavior of the genes that control its chemistry. And the genes themselves are long chains of nucleotides that make up molecules of deoxyribonucleic acid or, in abbreviation, DNA.

Start at the other end, then—

If we fiddle with DNA molecules, it is conceivable we may learn to adjust the genes. If we learn to adjust the genes, it is conceivable we may learn to modify the behavior of cells. If we modify the behavior of cells, it is conceivable that we can alter the state of individual human beings. If we alter the state of individual human beings, it is conceivable we may build a new and better society.

Those are a lot of "conceivables" and there is, of course, danger at every step of the way.

Yet we've started. Over the last 30 years, we have learned a great deal about the detailed manner in which DNA molecules produce replicas of them-



© WALTER VELEZ 1980

Earth where the insulation of thousands of kilometers of separating vacuum can further protect the teeming population of the Earth.

* * *

The real benefits of recombinant DNA research, however, have not yet even been scratched. To adjust microorganisms to produce this chemical or that, or to consume this chemical or that, is comparatively simple; like breeding cattle to produce more milk or chickens to lay more eggs.

Recombinant DNA research can be used to do far more than that; it can be used to study the deepest facets of the cellular machinery.

Individual DNA molecules in the cell govern the production of specific proteins called enzymes, each of which catalyzes, or speeds, some specific chemical reaction.

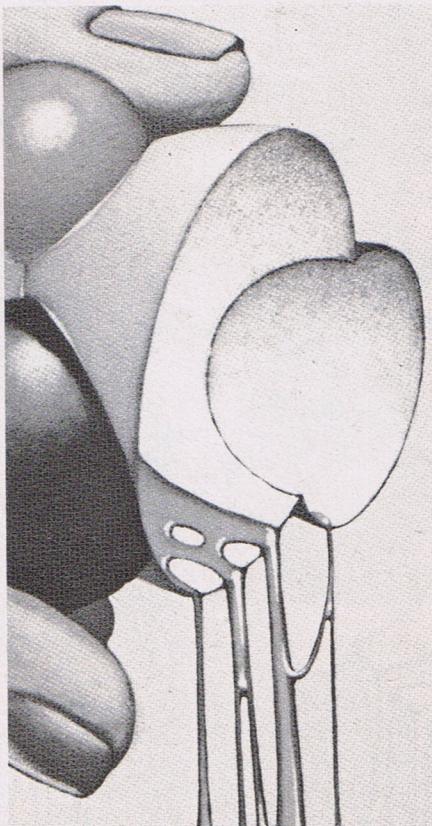
The chemical reactions do not, however, exist in isolation. Each influences others, and all the thousands of chemical reactions in the cell form a kind of network that is intimately interconnected, so that you cannot alter one without affecting all the others to one extent or another. (That is why all chemical treatments of any bodily disorder invariably have "side-effects.")

Further than that, enzymes, in catalyzing a specific reaction, do not work in isolation, but are themselves stimulated or inhibited by the manner in which other enzymes bring about their catalytic effects.

And still further, even the DNA molecules do not work in isolation. Each DNA molecule is influenced by its neighbors. In every type of cell, some DNA molecules are totally inhibited; different ones for each type of cell—even though the basic supply of DNA molecules in all cells is identical.

Therefore, in order to understand the workings of cells thoroughly, it is not enough to consider just individual reactions, enzymes or DNA molecules, as we have tended to do in the past out of sheer lack of ability to do anything else—but we must consider the entire overall "gestalt" of the cell.

Recombinant DNA techniques may offer us a chance to do that, since it may make it possible to introduce minor changes in specific DNA molecules in intact cells and observe the changes in



"If we fiddle with DNA molecules, we may learn to adjust the genes. If we learn to adjust the genes, we may modify the behavior of cells. If we modify cells, we may alter the state of individual human beings."

cellular characteristics that result. Changes here, changes there, combinations of changes, each one offering information; until, out of all the information, we begin to build a sense of the cellular lacework and to understand the pattern—not the individual strands that make up the separate parts of the pat-

tern, but the *whole*.

Will this not mean that we will rapidly outpace the ability of our minds to interpret the information we get? Will not the complexity of what we learn be too much for us?

After all, there are thousands of different DNA molecules in the cell, producing thousand of enzymes, catalyzing thousands of chemical reactions. Each molecule can be changed slightly. The order of the nucleotides out of which each is built can be changed slightly or radically; and the individual nucleotide can be slightly altered even while it retains its place in the molecule. The number of possible changes that can be made in this fashion cannot be called astronomical, since there are no numbers that one meets in astronomy that are large enough. We would have to say "hyper-astronomical."

It would be necessary to simplify the problem, of course, and in addition, to increase our own ability to handle it.

In simplifying, we would have to find key changes in our DNA manipulation. After all, not all changes produce really interesting results. If one were dealing with a huge factory, knocking out the change-giving facility on the coke machine would alter events in the factory far less than would be produced by distorting one of the key intercom devices. By searching for key changes and concentrating on those, the complexity would be reduced from the hyper-astronomical to the merely astronomical.

To increase our ability to handle the problem, there are computers. The human brain may not be able to handle all the variables and to perform all the operations quickly enough, but a computer might, and it is its analyses we would depend upon.

We could therefore learn how to map the DNA molecules of a cell thoroughly and, having produced the map, learn how to understand it thoroughly, and how to consider the potentialities of the cell under the control of those particular DNA molecules. If we then graduate from microorganisms with their single cells to human beings with their trillions of cells, we would find ourselves with a new order of fuzziness (since the cells all influence each other) but with a far greater level of importance to our work.

The time will come, perhaps, when each individual will have his gene-print

on record. In fact, it might be that every infant, on birth, will be routinely gene-printed in order to get a notion as to its potentialities.

This may be viewed as "playing God"; as putting each person into a slot from which he will not be allowed to emerge; as a way of establishing a new and more vicious elitism.

On the other hand, it is quite apparent that no human being ever realizes his potential in the hit-and-miss treatment he gets in our present society. Tailoring education and social influence to the actual potentialities of each may allow all human beings to be far better off than without such methods. Some may be more elite than others in one fashion or another, but all will be elite compared to today's people.

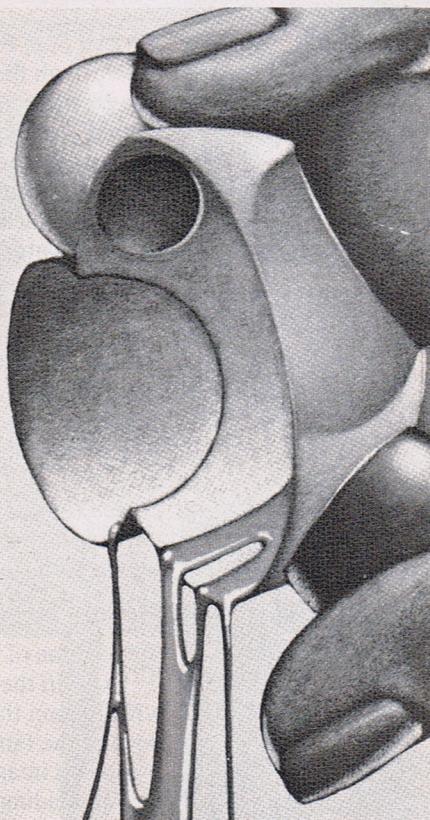
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Even this is not the limit. There are, to be sure, uncounted billions of different DNA molecules, differing in the total number of nucleotides; in the proportion of different types of nucleotides; in the order and arrangements of nucleotides. There are perhaps billions of billions that have existed in all the various organisms, from viruses to sequoia trees, through all the history of life on this planet over the last 3.5 billion years. Yet all of these, when compared to all the different molecules that could conceivably exist, shrink to virtually nothing.

Won't scientists someday, on the basis of what they learn from the DNA molecules that do exist, begin to work out tentative rules of behavior that can possibly be extended to DNA molecules that have not yet existed? If they do so, might they not learn what factors of DNA molecular structure might contribute to the production of a kind of pattern in a human being that would make it easier to develop intelligence, talent of one kind or another, creativity, humor, judgment, prudence, temperance, sympathy, love?

And won't scientists someday wonder if certain specific changes in nature or pattern of the DNA molecules actually in existence might not serve to improve certain human characteristics in ways deemed desirable?

There would be a strong tendency to want to produce those DNA molecules and to insert them in human beings, ex-



"Perhaps we can stave off destruction until we have learned enough about the human body to devise new patterns less likely to bring about that destruction. Perhaps we can guide human evolution in the direction of better-than-human."

cept that we would scarcely dare to do so on the basis of theory alone, for what side-effects (undesirable, or even fatal) might there not be?

There would have to be experimentation, therefore, and one might imagine laboratories in orbit given over to the science of "fetology."

We might imagine endless rows of human egg cells, carefully analyzed for their gene-print, carefully modified in certain theory-directed fashion, carefully fertilized with a sperm of known gene-print that is perhaps also modified. The fetus would be allowed to develop in the laboratory in order that its properties might be carefully and continually observed. Some might be allowed to proceed to term so that actual babies would be observed and some of these would be allowed to grow to maturity where that is necessary to test the theories.

Is such a science, and such experiments, repugnant? It is to me. But then, animal experiments are repugnant to me, too, yet there is no way of doing without them, so far, if medical and biological research is to advance.

What's more, human attitudes change. Dissection of human cadavers was once forbidden because it meant the desecration of the human body, but medical knowledge could not advance under that prohibition, and uncounted human lives must have been lost out of this exaggerated respect for the human dead.

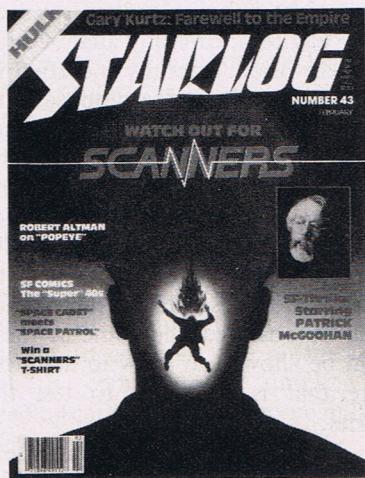
It may be that eventually people in general will recognize the importance of fetology to the survival of the human species. It is constantly being said that human knowledge has outstripped human wisdom and that machine-control has advanced beyond self-control; and that in this disparity of development lies the dismally huge chance that we will destroy ourselves.

Well, perhaps we can stave off destruction until we have learned enough about the pattern of the human body to devise new patterns less likely to bring about that destruction. Perhaps we can learn to guide human evolution and to do so in the direction of better-than-human.

Cynics may say that even if we learn to do so, the worst facets of human behavior will guide that evolution toward the self-serving benefit of the few and that the latter end will be worse than the beginning.

Maybe so, but I don't quite hate and despise humanity to such an extent that I feel there is no chance at all for us to learn to better ourselves, and honestly to strive to do so. And if there is such a chance, then it seems to me we ought to try for it.

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ION PROPULSION

Slender *Star Wars* types of spaceships gliding gracefully through the galaxies—the idea is often relegated to the category of science fiction, but ion propulsion is already factual history. In 1959, a year before this nation's first manned space flight, Dr. Harold Kaufman designed and tested a working model utilizing ion propulsion. "To the Stars on Quicksilver" traces the history of ion propulsion and postulates its factual future.

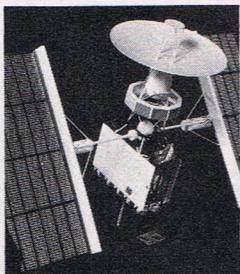
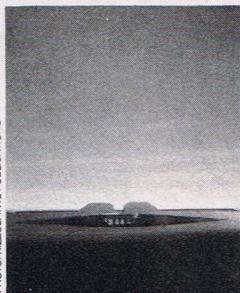


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HOUSES FOR SALE

The Leo Castelli Gallery in New York recently commissioned eight internationally-known architects to ponder the future of the one-family house. The result was a fascinating exhibit of eight futuristic, state-of-the-art structures that are more than simply the dreams of their creators—they could be built today. We'll take you for a guided tour of these future homes, with descriptions of the designs, techniques, materials and the architects, as well as some beautiful color photos of the models.

POHL ANDERSON INTERVIEW

He's one of the founders of modern science fiction, who in the past 34 years has authored scores of novels which retain their popularity today. Though he's not beyond the fantasies inherent in the genre, Anderson blends his imaginative narratives with a technical accuracy and an abiding sense of warmth and humanity. Interviewer Malcolm Brenner discusses a range of topics with Anderson, including his strong science background, public acceptance of SF and his latest novel, *The Demon of Scattery*, co-authored with Downey Broxon.



PHOTO © 1981 LADD

OUTLANDS

The time is the near future. The place is a mining complex on Jupiter's moon Io. The movie is *Outlands* and it's described by its producers, The Ladd Company, as "gritty and unpleasant, and the people who are building the mining colony are always looking over their shoulders rather than ahead, trying to stay alive and putting up with hell while they make some quick, big money." Starring Sean Connery, Peter Boyle and Kika Markham, and directed by Peter (*Capricorn One*) Hyams, *Outlands* brings SF cinema into new and fascinating realms.

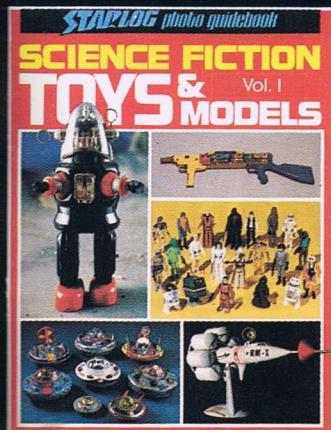
PLUS

G. Harry Stine discusses the faults in the space shuttle program in a candid Tomorrow piece... Ed Naha goes to California to talk with schlock master Roger Corman about his upcoming science fiction film projects... Word master Harlan Ellison goes through his mail bag to answer some of the more interesting offerings from readers... Lou Stathis begins a new column on Earth's weirder musical expressions... and a look at two new artists of the fantastic.

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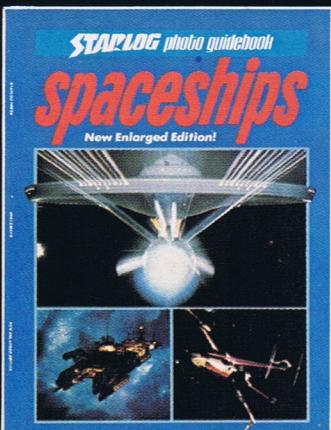
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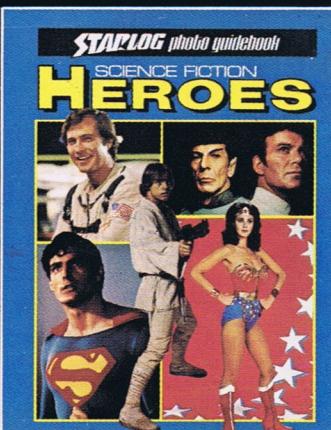
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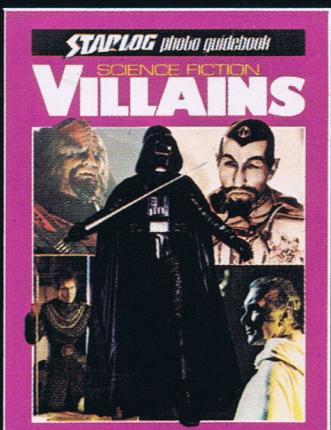
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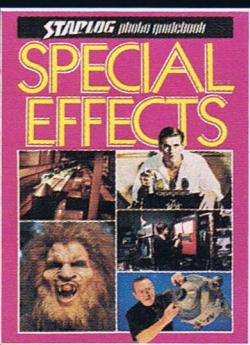


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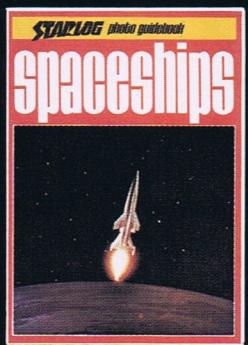
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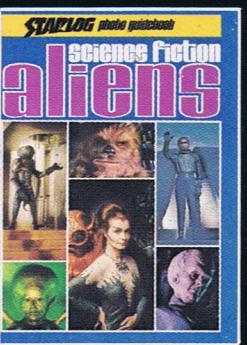
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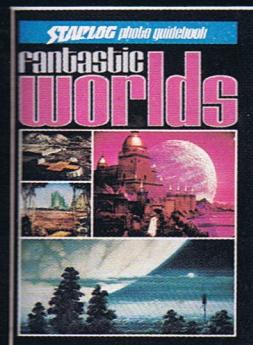
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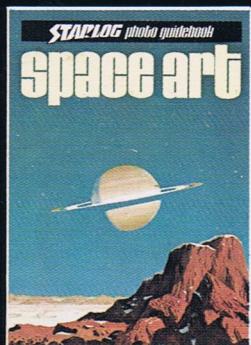
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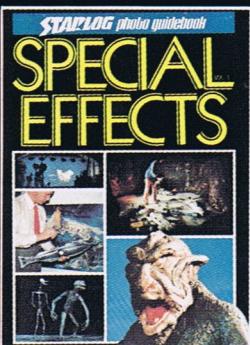
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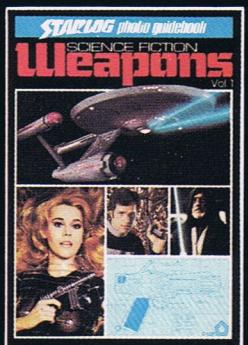
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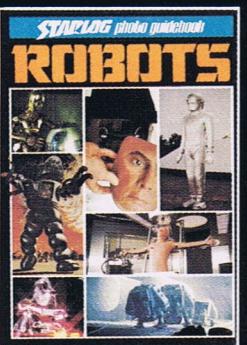
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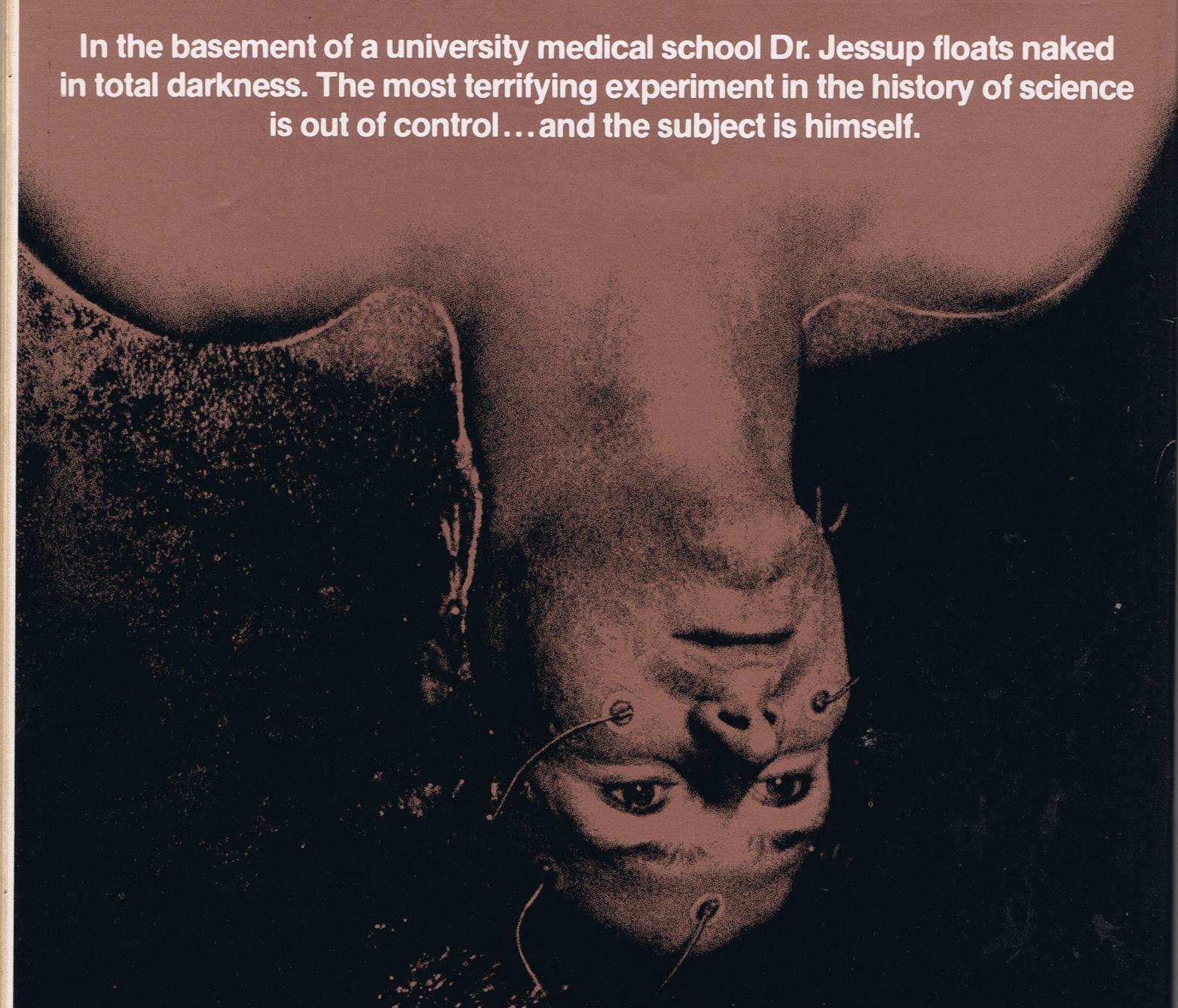
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